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VOLUME 45 NUMBER 8

OCTOBER, 1952

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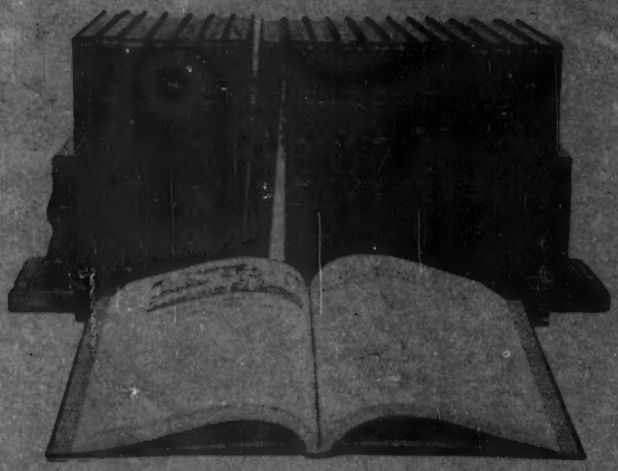

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Smart Robin

The robin that selected this nest site was taking no chances and seemed to have established a record for robin literacy. Johnnie Mittl of Kutztown, Pennsylvania, spied the nest on one of the Pennsylvania Game Commission signs and made the photographic record.

H. M. S. Beagle

Charles Darwin's Journal of Researches into the Geology and Natural History of the Various Countries Visited by H.M.S. Beagle. New York. 1952. Hafner Publishing Company. 615 pages, with plates and index. $7.50.

This is a facsimile reprint of the first edition of this famous Journal published in 1839. It is, of course, the story of the young geologist of twenty-five and the memorable voyage of exploration that had such bearing on the intellectual development of Charles Darwin. The original edition of this work is a collector's item and this facsimile of the original add interest to this new edition.

Queensland Parks

Some interesting material has been received from the National Parks Association of Queensland, with headquarters in the T. and G. Building, Queen Street, Brisbane. Not the least interesting is a series of advertisements, each one entitled "Save Our Native Fauna." The advertisements, of which there are twenty in the series, picture the threatened bird or mammal and provide brief popular text as to its habits and present situation. These advertisements are paid for by Carlton and United Breweries, Ltd., "makers of Victoria Bitter, a healthful beverage." The copy is most effective and the result is highly educational and should be a fine conservation force. There is a wide field for a similar activity in the United States.

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Nature in Print

By HOWARD ZAHNISER

WILDERNESS to most of us is vacation country, thought about for the most part in connection with occasional good-time escapes from a civilized life which itself somehow or other seems to be "reality." There is no doubt that in this recreational value there is an importance that warrants safeguarding our wilderness carefully. It may indeed be adequate to justify even the devotion of so many to wilderness preservation as a cause — a cause that becomes an aspect of righteousness because it seeks to preserve a pleasant and socially good resource, a manifestation of Life, against needless destruction for a lesser worthiness.

Yet deeper and broader than this value, encompassing it, is an importance of wilderness that relates it to our essential being, indicating that the understandings that come in its surroundings are those of true reality. So derivative do our lives seem from the wilderness, so dependent do we seem on a renewal of our inspirations from these wild sources, that we wonder sometimes if we could long survive a final destruction of all wilderness. Are we not truly and in reality human essentially as spiritual creatures nurtured and sustained — directly or indirectly — by a wildness that must always be renewed from a living wilderness?

Is it not with some such understanding as this that we realize the essential importance of our wilderness areas? Is it not thus that we can explain the fact that a wilderness vacation is remembered as more than sport, more than fun, more than simple recreation? Are not these the understandings that give such profound significance to the longer sojourn that a civilized man or woman occasionally spends in a return to wilderness?

All of us who are conscious of wilderness influences, and who reflect on their meanings, have had intimations of these profound values, and occasionally these thoughts, which we have surmised, are confirmed by the testimonies of individuals who — in the midst of our highly organized, mechanized, urban civilization — have been intimate with wilderness.

Martha Reben has had such an intimacy, and her book *The Healing Woods* is such a testimony. For a few days less than six months she — a Saranac Lake, New York, patient in the advanced stages of tuberculosis after "three years of bed rest and as many operations" — abandoned her treatment and, responding to the advertisement of an experienced and inspired guide, lived in a tent by Weller Pond in the Adirondack wilderness.

It was a new world; so new that at first "sleep was out of the question." "Life pulsed everywhere. Frogs bellowed, owls hooted, herons and bitterns squawked, and occasionally a fox barked." The strangeness of this wildness (in which we truly are at home) and its incongruities with Miss Reben's earlier understandings make *The Healing Woods* a fascinating human-interest story. Her experiences are sometimes humorous, often exciting, always well told, and they make her book one that will be widely enjoyed. Through it runs a deepening appreciation of natural surroundings, of their healing influences, and of their essential healthfulness. Out of it comes an opportunity for a perspective that all its readers, as well as Miss Reben herself, can realize. True living in the wilderness made the world that man has drastically modified for his own accommodation seem much less satisfying, much more unreal. On a visit to town Miss Reben found that she could not wait till the morning of the third day for a return; on the second day "while the sun was still bright in the west" she "headed once more for camp and Weller Pond." Of the village visit she writes:

"What I saw filled me with dismay. As I rode through the heart of the village in a taxi, the streets looked narrow and crowded, the fronts of the houses and stores incredibly dingy and ugly. I had forgotten how unlovely civilization was. . . . The merchandise seemed tawdry and shoddy and very much of it unnecessary to life and happiness."

"In camp," she comments, "we looked out over the open lake and beyond to the hills and to the sky above and there was everywhere a feeling of freedom and of clean open space. If my eyes did not always see beauty there, they saw at least perfect harmony of line and color. Back in civilization my woods-accustomed eyes were constantly being outraged. I kept wishing that everybody could go into some form of isolation for a while, so that he could return with eyes undimmed by habit to see just what modern life really offered him."

Thus the wilderness gave Martha Reben an understanding of the true realities. And when she was healed of her malady she continued, with her guide, Fred Rice of Saranac Lake, "to return to the woods each summer, though," she complains, "our season is now shorter at both ends." Like nearly all who thus have come to sense the efficacy of wilderness experiences for modern men and women, she also covets such opportunities for others. "We should like to think," she says, "that for future generations there will be, as there was for us, a vast unbroken wilderness, abundant with wildlife, to refresh both the mind and the eye." The benefits, she helps us see, would not only be corrections of the ills of civilized living but also better living in a positive sense.

"The wilderness did more than heal my lungs," Miss Reben writes in concluding *The Healing Woods*. "While it dwarfed me by its immensity and made me conscious of my insignificance, yet it made me aware of the importance of an individual, capable of thinking and feeling not what was expected of me, but only what my own reasoning told me was true. It taught me fortitude and self-reliance, and with its tranquility it bestowed upon me something which would sustain me as long as I lived: a sense of the freshness and the wonder which life in natural surroundings daily brings and a joy in the freedom and beauty and peace that exist in a world apart from human beings."

The now successful outdoor writer Bill Geagan gives us a similarly significant testimony in his book *Nature I Loved*. Yet in some ways this is a book with even wider significance, for Bill Geagan's account is not of a healing but of a young man's discovery of how he could find a place in our culture although frustrated by the city and at home in the woods. "All people living in large cities" appeared to Bill Geagan "like high-geared toys wound up to the bursting point, and controlled by alarm clocks, whistles, and train schedules." His employments in this "hurried and crowded life" were so frustrating that he moved off to a cabin that he fortuitously acquired in the Maine woods at the headwaters of Hermon Pond, "really a part of the great Sourdabscook that drains the vast area." Here, to the distress of his

Arum

By AUGUST DERLETH

The arum is by snow undaunted.
Only pussywillows have long flaunted
buds against the chill late winter air
when the arum comes to blossom where
ice and mounds of snow
defy all else to grow.

The arum need not like another bloom be shown;
it makes its presence known.
It grows as sturdy as a tree
and harbors many an early honey bee.
More than any other bloom it goes
by calendar and never minds what weather blows.

Something sure as this in these uncertain days
deserves a little more of praise.

parents and others who cared for him but thought that he was shiftlessly wasting his youth, Bill Geagan first learned how to live, then found an Alice among the members of a girls' camp on vacation in these woods, and finally through his writings realized his peculiar achievement.

In *Nature I Loved* — a book that it would seem to me every reader of this "Nature in Print" page would yearn to have and read — Mr. Geagan tells mainly the truly exciting and fascinating story of his year-round life in the woods, with its wildlife, his very few and distant human neighbors, and the vacationers whom he served. Nearly three dozen marked passages cry out for quotation, and several themes come to mind for discussion. Such a stimulating book it is. Yet most important of all to Bill Geagan (and to us) is its testimony, in the words of the dust cover, of how "the Maine Woods taught a young man how to face up to life and be at peace with himself and his fellow men." And of peculiar interest is the fact — although Bill Geagan does not himself point it out — that he was able to achieve his place in modern society, while maintaining his intimate touch with the natural world, essentially by serving his fellow men who likewise need contact with the wild outdoors. He demonstrates not only the need that some individuals have to live directly with wilderness, but, also, the importance to "society" of such individuals who will bring to all of us vicarious experiences that, while indirect, are still derivative from a true living wilderness.

Inexplicably, during the questing, groping life in his bachelor cabin, Mr. Geagan was inspired to write of his wilderness and its wildlife. "I didn't know then nor will I ever know," he confesses, "why I had that sudden urge to try my hand at writing. It came suddenly, like a summer shower, and clung to me like lichen to a stone." When his offerings to magazine editors were accepted he realized that he had at last created the opportunity he sought, and he felt indeed a calling "like those called servants who represent Him in His churches across the world."

"My love of the outdoors — the woods, waters, mountains, and wildlife — became more intense as time rolled on," he testifies. "And," he continues, "my writings leaned more and more to conservation. Finally one gorgeous day the next spring as I gazed from my favorite ridge at the great expanse of land and water below me I knew I could never be away from it all for very long. Not only that particular region but the outdoors in general. Then suddenly I believed that God had sent me to protect these priceless gifts from all who through ignorance, carelessness, or greed would destroy them, by preaching with the written word the gospel of conservation, and if necessary fighting for them in the same manner."

He left his woods living, schooled himself with newspaper and magazine employment, and then — in the words of the book's concluding paragraph —

". . . suddenly it was another June — lovely month of birds, and buds, and brides. Alice was among the latter. And a few hours after she had accepted me for better or worse, we were back in that region of lakes and woods where I found that Nature's horn of plenty will provide for those who seek it in God's outdoors, and that a man can find himself in such an environment as I had found myself, and Alice."

The wilderness that healed Martha Reben and gave her joy, in freedom and beauty and peace, and a sense of the freshness and wonder of life, and taught her fortitude and self-reliance — the wilderness that oriented Bill Geagan and, not only sustaining him but providing him with the inspirations with which to bring recreations and refreshments to many readers, taught him the righteousness of conservation — surely this wilderness is more than playground.

Nature I Loved. By Bill Geagan. New York: Coward-McCann, Inc. 1952. 241 pp. (5½ by 8¼ in.), with 25 chapter-head drawings by the author and a foreword by De Witt Mackenzie. $3.

The Healing Woods. By Martha Reben. New York: Thomas Y. Crowell Co. 1952. 250 pp. (5⅝ by 8½ in.), with 7 chapter-head drawings and end-paper map by Fred Collins. $3.

Southwest Flowers

Flowers of the Southwest Mountains. By Leslie P. Arnberger. Santa Fe, New Mexico. 1952. Southwestern Monuments Association. 112 pages. Illustrated by Jeanne R. Janish. $1.00.

This is the seventh publication in the Popular Series published by the Southwestern Monuments Association in carrying out one of its objectives, which is "to provide accurate and authentic information about the Southwest." It is a popular guide and a companion publication to two others in the series that have dealt with flowers of southwestern deserts and southwestern mesas. The common and conspicuous plants are considered and 150 different plants are included.

Raccoon

The Raccoon. By Leon F. Whitney and Acil B. Underwood. Orange, Connecticut. 1952. Practical Science Publishing Company. 177 pages Illustrated. $3.75.

This is a book with a different approach to the interesting mammal, the raccoon. Its authors are, respectively, a biologist-veterinarian and a raiser and breeder of raccoons. To add to the information arising from their own studies of the raccoon, they have brought together much other widely published data. The authors go into the psychology of the animal in interesting fashion, and have assembled an excellent bibliography about it.

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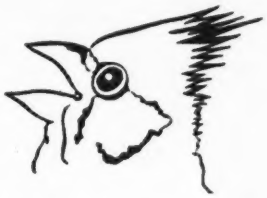

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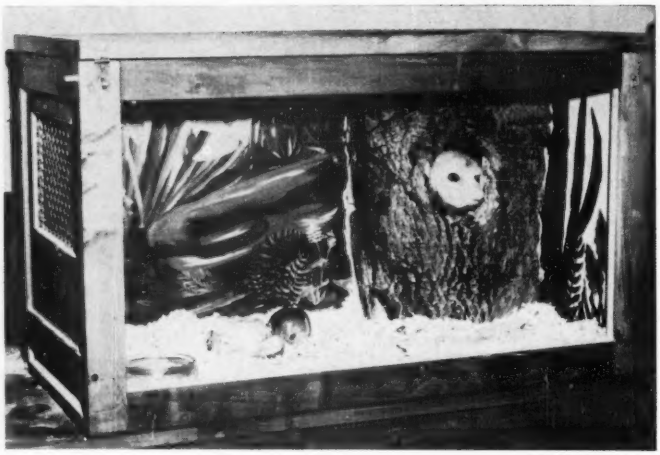


MANY are the articles and ideas for housing "man's best friend," the dog, but there are few articles and ideas for housing the random snake, toad, turtle, opossum, flying squirrel, or other small wild animal that Junior might bring home from the surrounding neighborhood. If allowed to collect them, Junior no longer will delight in tormenting such wild "pets."

Such a cage as the one here described can be modified in any way the builder desires to meet the requirements of a number of different small mammals or reptiles. The basic, over-all dimensions however, are just large enough for the larger small mammal, such as an opossum, and not too large for a smaller animal, such as a horned toad or a box turtle. The interior may be fixed up in a great variety of ways, depending upon the nature of the inhabitants. For a horned toad, for example, various kind of cactuses could be placed around in the cage, with sand built up around the pots to hold them in place and conceal them. For frogs or salamanders a low pan of water can be placed in one end of the cage with moss and small ferns planted around to make a natural setting. The possibilities are endless.

Such a cage also has considerable scientific value to a student of the habits of various animals. It also is ideal for the amateur Nature photographer as the whole front and top is of glass, giving room for ample illumination and for focusing from various angles.

It is also an ideal type of cage for exhibition purposes. The author has used a number of such cages in a natural science exhibit prepared each year by his students.

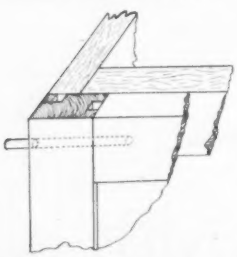


Fig. 1

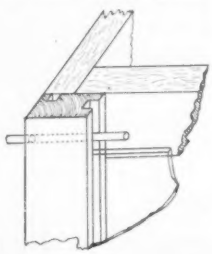


Fig. 2

The accompanying photograph shows one of the cages housing an opossum. A piece of log with a hole in it was fitted in one corner of this box to resemble a den in a tree; then a box about eight inches square was constructed of plywood in such a way that it slides into slots opposite an opening in the back of the cage. This enables the animal to crawl through the hole in the log straight back into the box where it sleeps.

This type of cage is constructed from one-inch by two-inch pieces of maple and one-fourth-inch plywood. Three-fourth-inch plywood was used for the bottom. The one-inch by two-inch pieces must be of maple or other equally hard, close-grained wood, as the author has learned from experience that many animals will soon gnaw through softer woods. The plywood panels present a flat surface to the animal's teeth, making it nearly impossible for him to gnaw through these. Ventilation is provided by openings in each end panel covered with hardware cloth, or quarter-inch wire mesh.

The over-all dimensions are: 33 inches wide, 20 inches high, and 16 inches deep. A 13-inch by 30-inch piece of glass is used in the top and a 16-inch by 30-inch piece of glass in the front. Double-strength safety glass is recommended, although plate glass in front and double-strength glass on top is satisfactory.

The back and front are assembled as panels, then attached to the bottom, with the side panels being assembled last. The entire cage is doweled together with one-fourth-inch dowels and waterproof glue. This makes for a strong, durable cage. The top is hinged.

The member across the top-front of the cage may be taken out by withdrawing the dowels at either top side. This is done to replace or remove the glass for ease in cleaning out the cage. A close examination of Figures 1 and 2 will clarify the construction of this feature. Figure 1 shows the cross-member in place, and Figure 2 shows it removed revealing the top edge of the glass.

I will be glad to answer any questions that arise.

Contents Noted

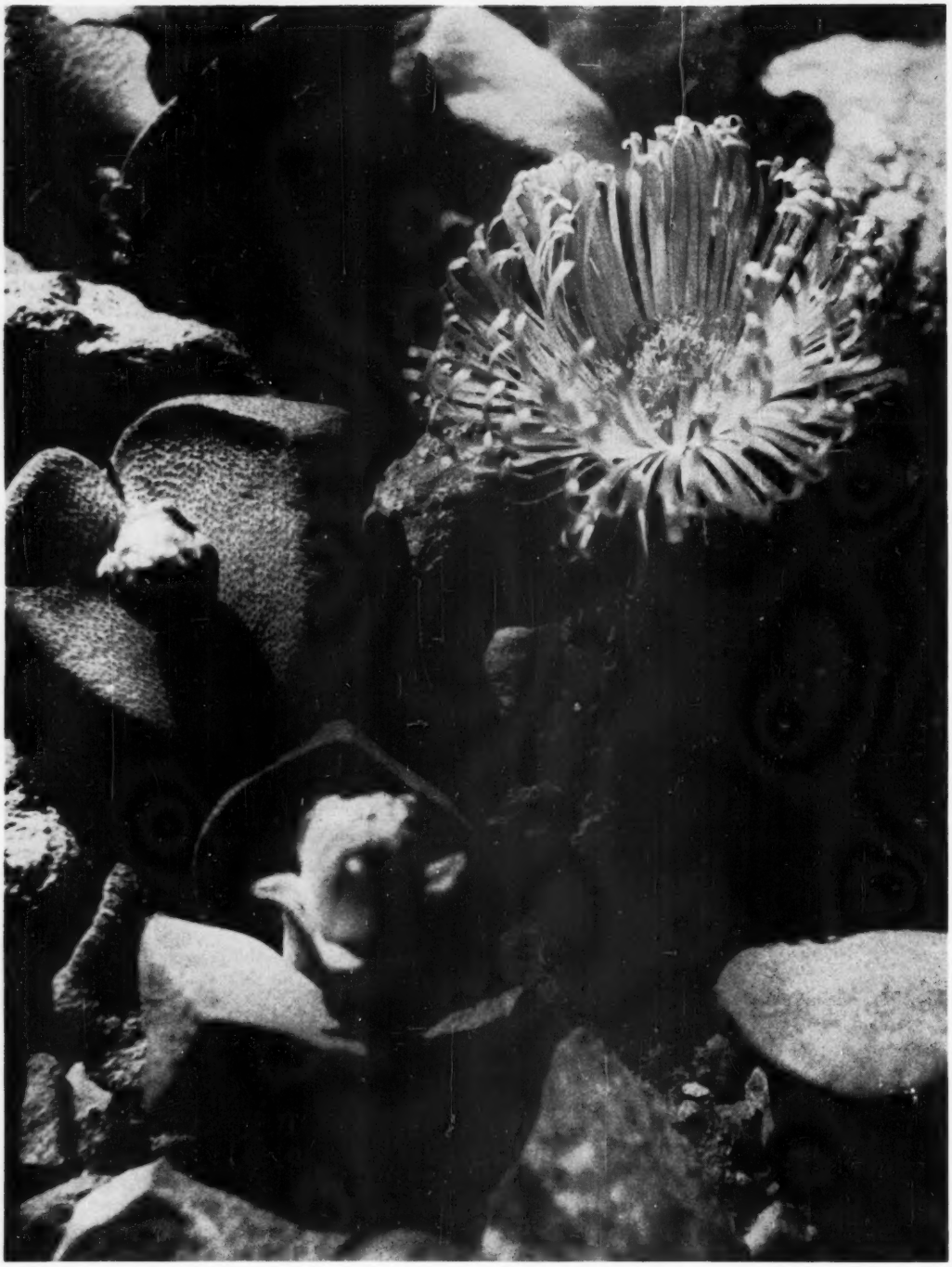
ALTHOUGH the instinctive social habits of cowbirds are admittedly subject to question, Vega Ihsen of Erie, Pennsylvania, contends that they are beautiful birds. She reports a cowbird-song sparrow incident of recent observation. The little mother sparrow was kept busy feeding a young cowbird, three times her size, at the expense of the welfare of her own offspring. Miss Ihsen's mother decided to take a hand, and, making clucking sounds intended to have some significance in bird language, provided the youthful cowbird with bits of bread soaked in milk. The youngster found the diet pleasing, although it preferred white bread to rye or whole wheat. Anyway, it seemed to thrive. The song sparrow seemed rather mystified at this menu, but its own young began to receive better rations and to prosper. The cowbird seems thoroughly weaned and comes immediately in response to whistles and offerings of bread.

BACK in gold rush days in California burros served the miners by carrying their outfits on the search for the yellow dirt. Many of these burros were left or lost, and they were the ancestors of several thousand wild jackasses that roam the Mojave and Colorado deserts, the Saline Valley in Inyo County, and the "hump" in northeastern California's Lassen-Modoc area. The California Department of Fish and Game reports that these feral burros have become a nuisance, taking over and ruining precious desert springs and water holes, and destroying forage for wildlife and stock. They are also one of the few animals that will kill the young of other species. They seem seldom to be the victims of predators, so increase steadily and are the lords of their ranges. There is no closed season on them, and the meat of the burros, which is reported to be excellent, is restricted by State law to human consumption.

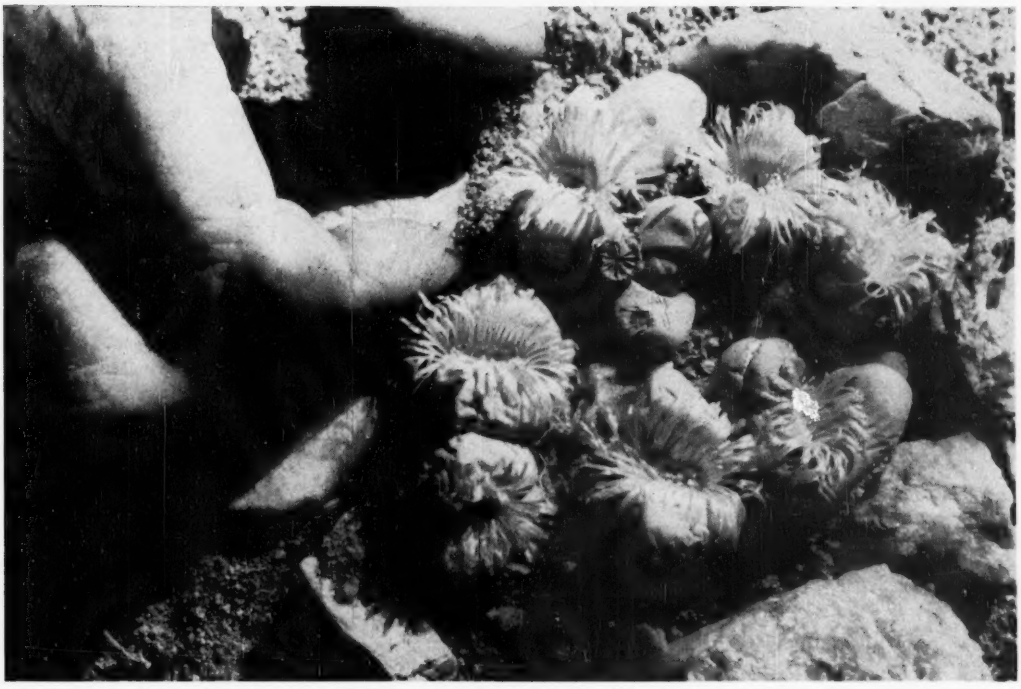
FROM the red, blue and green twine hung on a clothes line, reports Robert Irvin Sweet of Binghamton, New York, the oriole had deftly fashioned its beautiful basket nest high in an apple tree. There it laid its eggs and there the young hatched. But one day there was turmoil, the orioles flying at the nest in panic and scolding frantically, while other birds came to add their indignation at what apparently was an invasion of the pensile home. The nest, however, was too high for human inspection, and all that Mr. Sweet could do was to watch for some clue to the cause of the uproar. Finally what looked like a twig appeared over the edge of the basket. It was a snake. Calling a neighbor with a shotgun, and taking care to disperse the assembled birds, a second volley at the nest tore out the bottom and left a snake dangling and wriggling, finally falling to the ground. It was a four-foot milk snake, the young orioles in its digestive tract. After a full meal the snake had managed to coil itself for a nap inside the nest, which made "a comfortable hammock rocked in the June breeze." Mr. Sweet added that, while the milk snake does consume considerable bird life, its kill of rodents balances the credit in its favor.

WITH the passing, on July 6, of Elizabeth B. Lawton the cause of roadside control lost its most dynamic leader. Chairman of the National Roadside Council, she first became active in this field more than thirty years ago, when she headed the General Federation of Women's Club committee on the restriction of outdoor advertising. More recently the National Roadside Council, working through State Councils and the national headquarters in New York, has been concerned with all phases of the protection and improvement of the roadside environment. With Mr. Lawton, Mrs. Lawton traveled widely, gathering factual material, supported by photographs, showing the dangerous and unsightly encroachment on the highways by unregulated business and the ubiquitous and parasitic billboard. This practical approach to the problem made Mrs. Lawton both feared and respected by the organized outdoor advertising industry. She always saw through, and exposed, the industry's schemes to head off regulation by espousing "cooperation" with public agencies and private organizations. Mrs. Lawton was always a crusader, but one armed with the razor-sharp weapon of facts. It may safely be said that she gave her life for the cause in which she believed, for she taxed her heart to the point that it was unequal to carrying her farther. Mrs. Lawton's monument is the record of the past thirty or more years. It was a privilege to have known her and to have worked with her during most of the past three decades.

CONGRESS folded its tent and not so silently stole away to the turmoil of the political conventions, leaving two important pieces of conservation legislation without action. One of these was the Tackett Bill, which would have applied a percentage of the receipts from National Forests to the administration of the recreational activities within these areas. A second bill was that seeking to provide protection to the little band of Key Deer left on some of the Florida Keys. Both measures will have to be reintroduced in the new Congress, but just what will happen to the tiny deer in the meantime is anybody's guess. Another legislative proposal that did not receive action is that seeking approval for the building of Echo Park Dam in Dinosaur National Monument. Conservationists expressed no regret that this is delayed and, too, must reappear in the new Congress. Other less important conservation measures were left in committee pigeon holes, or otherwise languished, in one stage or another, along the legislative by-ways of Congress. R.W.W.



The angular, finely dotted leaves of a spotted stone plant, *Pleiospilos bolusii*, mimic in shape and texture the angular rock fragments among which this plant grows. The yellowish flowers open late in the afternoon.



A closeup of some silverskins, *Argyroderma*, in flower with yellow blooms. They are growing in Namaqualand. The blossoms open in mid-afternoon when the sun is the hottest. The seed pod shown will open only after rain, thus assuring successful germination.

"Stones" that Flower

By HENRICKS HODGE

Photographs by the Author

STONES that flower? They do not really, of course, yet in many parts of arid South Africa grow certain kinds of stemless succulent plants that look like small stones. It is only when they produce their colorful pastel flowers that they temporarily cast off their disguise to show that they are plants and not just desert pebbles.

Most "flowering stones" claim kinship with a botanical sorority, the mesembryanthemums (literally "noonday flowers"), famed, along with the aloes and euphorbias, as one of South Africa's noted groups of succulents. As such they have become adapted successfully to desert existence by means of fattened body structures, which serve as reservoirs for all-important water storage.

These strange plants are one hundred percent South Africans, and are inhabitants of regions in that country subject to prolonged drought. Their calling cards, when plants are grown away from home, carry exotic geographical names such as Bushmanland, the Namib, Little Namaqualand, Griqualand West, or the Little or Great Karroo. The tracts that bear these names encompass much of the rain-starved lands that run throughout southwest Africa, south almost to Capetown, and thence easterly into the hinterland enclosed by the great curved escarpment that is South Africa's Drakensberg Range.

A day's travel by car east or north of Capetown brings one into the land of the flowering stones. Residents of our own Southwest, were they to travel here, would feel quite at home; for arid districts, wherever they occur in the world, have a certain sameness in their aspects, a sameness evoked by the influence of similar environmental conditions.

As in most deserts, bare spots, relatively free of any vegetation, are not uncommon. Sometimes sandy, they are more likely to be stony, covered with gravel or boulders. Although seemingly free of vegetation, gravelly patches like these are the most frequented

Yellow-flowered cone plant, *Conophytum calculus*, in southern Namaqualand. Like Siamese twins, the single leaf-pair of a cone plant has become so closely fused together as to look like an insignificant, pale-green globe. There is only a tiny central fissure, from which the flowers are pushing out, to indicate where the two leaves were once separate.

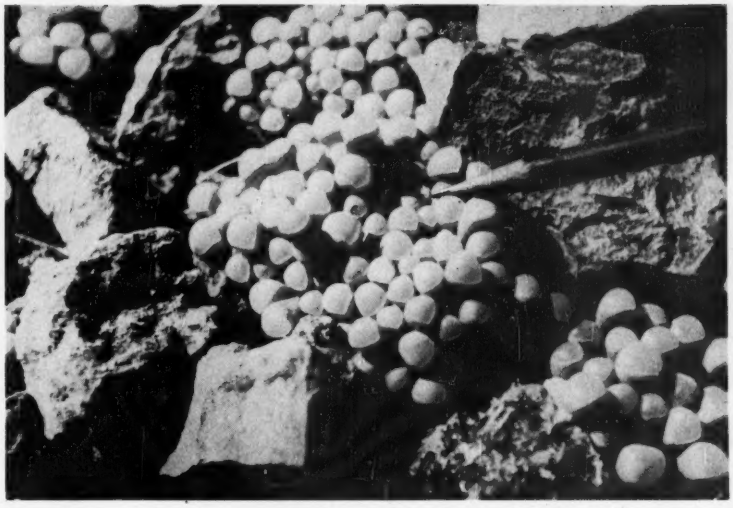
homesites of stone-like plants. Suppose that one should stop at one of these gravel patches in Namaqualand. As it often happens, white quartz pebbles are distributed solidly over perhaps an acre or more, forming thin layers over the soil of no more than a few inches deep. Yet one would swear that nothing could grow on such a gravel heap. In fact, nothing growable seems to be here. But what is this? Someone has dropped a plucked flower, a radiantly yellow daisy it seems. It is still fresh though — "as a daisy" one might add! You stop to look closer; then kneel down to examine the curiosity of a fallen flower on a stone pile, still fresh although lying under a blazing desert sun. Investigation reveals that the flower is seemingly attached to a stone. Better said, it seems to be growing from a crevice or crack between two of the milky-white pebbles; at least what look like pebbles. You touch them, then pinch them. Not stone-hard, they are turgid succulent leaves, a single, silvery-colored pair of them. What you have found is a "silver-skin," known as *Argyroderma*, one of the classic examples of South Africa's flowering stones

Silverskins share many of the characteristics of their sister stone plants, so, perhaps, it would pay to take a closer look at our find. Kneeling down better to examine the plant, it comes to you suddenly that there are other silverskins about, dozens of them scattered here and there among the whitish pebbles. There may be several to each square yard. A few are in bloom, but many lack flowers. Those without flowers are so perfectly camouflaged that you cannot fail to marvel at how seemingly well-protected they are out here in a desert no-man's-land. For in such sites succulent leaves are at a premium and any wandering animals such as antelope, ostrich, or baboon would be specially on the lookout for a few extra mouthfuls of juicy silverskin salad.

Like the swollen stems of cactuses, the obese leaves of silverskins, with countless extra water-storing cells, form efficient reservoirs that enable the plants to live through the long periods of drought characteristic of their arid homeland. Not only this, but the two leaves together make a near-spheroid form, which, from an architectural standpoint, has not only the greatest possible storage capacity within for water, but also possesses a minimum of evaporating surface. In the desert, where conservation of life-giving moisture is of prime necessity, these two features are "musts" if a plant is to survive.

Even more extremely adapted to arid conditions are the paired leaves of a cousin of the silverskins, the cone plants, *Conophytum*, whose species often spot the quartz patches with equal obscurity. Like Siamese twins, the leaf-pair of a cone plant has become so closely fused together through evolutionary change as to look, when viewed from above, like a single insignificant, pale-green globe.

Besides serving as efficient reservoirs of water, the leaves of silverskins and cone plants, as well as many of their relatives among the succulent "mesembs," are among the leading as well as original examples of "mimicry" in the plant world. For not only are they

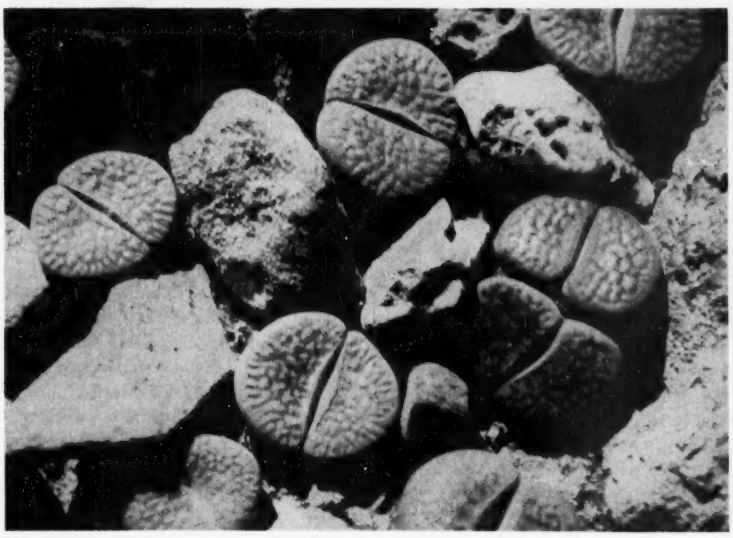


Here are some of the classic "window plants," known as *Fenestraria rhopalophylla*. They take their name from their leaves, which have tiny, clear, triangular "window panes."

shaped like stones, but they also have the very color of the stones among which they usually grow. "Mimics" such as these are the counterparts among plants of the numerous and perhaps more familiar examples that one finds in the animal world, especially among insects, where are to be found such oddities as bee-flies, walking sticks, "dead-leaf" butterflies, and the like.

A strange fact, too, is that the stone-like plants actually appear to be limited in their distribution to the patches of white quartz. A person can wander away from the patches to the darker soil and look "until blue in the face" for an *Argyroderma* or *Conophytum*, but usually without luck. When you are back on another quartz patch they again show up. The underlying soils, in which the plants are rooted, are the same, whether bare or whether covered with a rubble of quartz, yet the silverskins and their *confrères* seem to select only the quartz-covered sites.

The stone plants described thus far would be wonder enough, but there are related genera that are even more amazing. For although silverskins and cone plants mimic to a remarkable degree the color and shape of the quartz pebbles, some of their close cousins accomplish not only this but add the ability to mimic stone texture as well. Witness the genus *Lithops*, whose very name means "stone-like," or the spotted stone plants of the genus *Pleiospilos*, whose leaves look like angular fragments of granite. The paired leaves of *Lithops* are flattened on the top, and, better to match the surroundings, they are irregularly wrinkled, resembling the very texture of the surrounding rocks or soil. The strange thing is that whatever the soil color —



The paired leaves of *Lithops peersii* are flattened on the top and thus better match the surroundings in which they grow, and they are irregularly wrinkled to add to their resemblance to the rocks and soil around them.

The puzzle is to find the silverskins. There are six plants, two with yellow flowers, on this patch of white quartz. Can you spot all six?

whether yellowish sand, grayish shale, or ferruginous earth or stones — the wrinkled and flattened tops of the leaves of the several species of *Lithops* always seem to match.

Species of *Lithops* tend to be buried in the soil, with the result that only the flat tops of their leaves show from above. This subterranean habit does not merely help to keep the plant better hidden from the eyes of predators, but it is also helpful in another way. By being buried the total evaporation surface of the leaves is reduced, and water, which might otherwise be lost if the leaves were entirely above ground, is thereby conserved.

But all plant leaves must have sunlight. A partially buried leaf loses some of its photosynthetic surface, even though such reduction of surface serves the purpose of conserving moisture. Strange as it may seem, some stone plants have been able to get around the horns of this vegetable dilemma by an unusual improvisation. All that had to be done was to eliminate the green layer from the flat tops of the leaves and the result would be a sort of built-in skylight to admit light. This is just what has happened in most species of *Lithops*. Acting exactly like the windows of a house, through which passes daylight to diffuse into and lighten all corners of a room, so these unbelievable tiny windows, composed of thousands of transparent living cells, transmit life-giving solar energy down into the interior of the stone plant's fleshy leaves, there to be reflected, not upon the outer but, rather, the inner surface of the green mantle of chlorophyll. A novel and yet highly efficient way to counteract what otherwise might have been a disastrous consequence of the subterranean habit!

Skylight windows are not limited to the genus *Lithops* but are shared by about a half-dozen cousin genera among the Mesembryanthemums. *Fenestraria*, of the sandy wastes of the Namib of Southwest Africa, takes its name from its fenestrated leaves, with their clear triangular "panes," making this one of the most famed of the so-called "windowed-plants."

For all their artifice and mimicry, stone plants, surprisingly enough, still fall prey to sharp-eyed (and probably even more important, keen-nosed) desert dwellers. Their tasty succulence makes them eagerly sought out, often at night, by all sorts of animals preferring a vegetable diet. Troops of baboons have been seen stalking over the quartz patches inhabited by certain of these plants. Ante- (Continued on page 442)

The penguins pause for a moment in the course of their walk. The gentleman at the upper left in the photograph is Mr. Bowles, Director of the Edinburgh Zoo. Next to him is Mrs. Pittman, who tells us here about parading with penguins. Below, some of the birds looking like an academic procession.

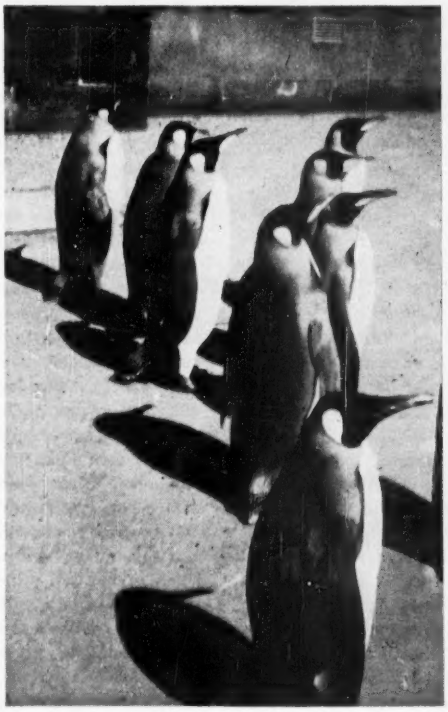
We Walked with the Penguins

By DORA H. PITTMAN

Photographs by Doris M. Cochran

In October, 1950, the cover of a national weekly magazine showed the delightful custom of penguin-walking in Edinburgh, Scotland. A friend and I decided, that very Sunday, that *this* we would have to see, should we by any chance be able to take a long-hoped-for journey to Scotland in the spring.

On a May afternoon in 1951, on our arrival in Edinburgh, my friend called the zoo to inquire about the penguin-walkings. For some reason she could not get through to the zoo, so decided to call a travel information service. A morose Scotch voice answered that he "had never heard of it." Telling the Scotsman sweetly that she was one of two middle-aged American women who had crossed the Atlantic to witness this phenomenon seemed to embitter him further — judging by my friend's falling facial expression and her increasingly discouraged-sounding responses — and caused him, I gathered, only to maintain more stoutly that he "had never heard of it." To assuage her disappointment, my friend decided to do some quick genealogical study via the telephone directory. I have not yet learned whether she was elated or discouraged by finding her family name listed 91 times in the Edinburgh telephone directory. But we just could not drop the penguin-walking question so easily, so inquired of the information clerk in the hotel lobby on our way out to do a bit of sightseeing. We were told by him, in no uncertain tones, that *he* "had never heard of it" — eyeing us with a mixture of amusement and suspicion. Americans do ask the strangest questions, his expression indicated.



We "did" Edinburgh by street car that afternoon and

A rear view of penguins negotiating steps, often after several tries, is an experience that is not soon forgotten.

evening by the simple expedient of taking round trips on the trolleys that ran past our hotel. Each boarding of a street car was preceded by a short but terse bit of travel advice by the starter and, I might add, when an Edinburgh tram starts, it starts! Although we enjoyed our sightseeing we still felt that much of the fun of our stay would be lost if the penguin-walkings did not take place. Returning to our hotel for dinner rather late, we met a delightful Army couple — a major and his wife. We decided that they were people who could be trusted with matters of import, so we told them about our quest in regard to penguin-walkings. They shared our lamentations and earnestly asked to be informed, should we by any good fortune get to the bottom of the matter.

The following morning, after breakfast, my friend suggested that since I was supposed to be good on the phone, I might call the zoo! And this a Sunday morning in Scotland! I did and the response was: "Of course the penguins walk; at eleven o'cock each morning." Stuttering a bit, I managed to tell of our interest and so touched was the Zoo Director, Mr. Bowles, that he invited *us* — yes, just two middle-aged Americans — *to walk with the penguins.* Many people have been presented at court, or even have been to the White House, for that matter, but how many have had a formal invitation to walk with penguins? As we were hurrying to our appointment we thought of the major and his wife. Fortunately they were by then in the dining room and we told them. I am sure that the breakfasters around them could only think that we had brought the major good news about a most vital security matter, judging by his beaming response and the smiles that wreathed his pretty wife's face. We were told to run along and they would join us shortly at the zoo, which we and they did.

Mr. Bowles, Director of the Edinburgh Zoo, met us at the gates and spent the half hour before the penguins were to stroll by showing us the charmingly laid-out zoo. He told us that the Edinburgh Zoo has eight species of penguins, including the tiny fairy penguins that were nesting when we were there, and also that the zoo has been successful in getting the penguins to breed and to rear their young. Some of the penguins with whom we walked were last year's hatchlings. Mr. Bowles attributes his zoo's success with the penguins to a diet of fresh-water fish (which is contrary to logic) and the abundant exercise. The penguin-walkings started many years ago and have proved popular with the penguins, the people of Edinburgh, and visitors. Mr. Bowles said that not infrequently he receives inquiries as to whether the penguins really go walking beyond the zoo and he is always glad to report that the rumor is true. The walks are entirely permissive as far as the penguins are concerned. Those who want to walk, just line up at the proper gate. They seem to have an excellent time sense, for those who want to stroll are at the gate when the gate-opening moment is at hand, precisely at eleven. Any penguin who has household chores, such as nest-building or setting that needs to be done, just stays behind to attend to such tasks.

Promptly at eleven o'clock the gates to the penguin run open and the strollers appear, looking for all the world like an academic procession, the only jarring note being a broom and brush man who brings up the rear for quite obvious reasons. "Talking" and looking about, eighteen penguins began their constitutional, accompanied by a greater number of humans the morning we were there. But, please remember, my friend and I were *invited* especially. Sometimes as many as forty penguins walk, the procession being always headed by two small Adelie penguins who trip along as fast as their short legs will permit, while the king penguins and others follow more sedately. A frightful din, and what one judged to be rather an uncomplimentary exchange of remarks, occurred when the walkers passed an enclosure where some splendid newcomer penguins were in quarantine. The newcomers began hurling their remarks as soon as the strollers came into view and some of the walkers stopped long enough to reply, while others kept walking, but talking over their shoulders. However, none of the strollers tarried long for they were much more interested in walking than in

settling their differences at that moment, evidently knowing that the newcomers would be where they were upon the walkers' return, and the rather impolite conversation could continue.

Of their own choosing the penguins take the winding walk, in which there are no steps, that slopes down toward the main gate on going out, but on the return they always choose the opposite walk, which has steps at several terraced points. The rear view of a penguin negotiating steps, which sometimes takes several tries, is something one does not soon forget. The two small leaders are always in a tremendous hurry to reach the main gate, where all are required to foregather in a group before going out on the street. This waiting time is not wasted by the Adelies, for there are baby prams parked at the gate for the use of visitors with small children. These prams have leather safety straps that dangle invitingly and the two smaller penguins pass the time playing with the leather straps until the kings arrive. It is great fun, one gathers, judging by the way the little fellows continue their play until the last moment before the gates to the street are opened, when they again lead off.

Once the whole group is assembled, the main gates are opened and the penguins go out on the broad street, where they are accepted as a matter of course by those in the know. Others are a bit startled and amused. While walking, the penguins observe human passersby rather critically, at times turning to stare at someone who has particularly stirred their fancy, but always giving special attention to busses, trolleys and trucks. There is no indication of fright, only of curiosity. Although the penguins are friendly they do not like to be approached too closely. One of the king penguins was moulting and the Director of the Zoo wished to obtain a wisp of down, but he was dissuaded by violent squawks and flapping flippers. Mr. King Penguin was not giving up a single bit of down, even though a large swatch of it was about to be blown off his ample bosom.

When their chaperone decides that the penguins have walked far enough a gentle "shooshing" starts them back home. We walked with the penguins part way back to their quarters and then returned to the down town area of Edinburgh to continue our sightseeing.

Some people think of the Trossacks, the castle on the hill, the Burns monuments, or the lovely old churches and churchyards, when Edinburgh is mentioned, but to us, mention of the Queen City will always make us smile, for it just means that we saw penguins walking.

Yellow Star-Grass

By EDWIN F. STEFFEK

THE yellow star-grass, *Hypoxis hirsuta*, may not be as big and showy as some of our other wildflowers but it is just as surely being pushed back farther and farther toward oblivion.

Once fairly common in open woods, thickets and pastures from Maine to Ontario, and south to Florida and Texas, it is now gone from many of its former haunts. A house now stands where the accompanying photograph was taken. It is not too fussy; rather tolerant regarding soil, although it seems to prefer it light, sandy and moderately acid. Often it is found in the company of the Canada mayflower, various grasses, azaleas, bayberries and greenbrier, especially near such trees as oaks, tulip trees, dogwoods and wild cherries.

Blooming from April on, often to October, it is suitable for rock gardens, planted in groups of a dozen or more, and five to six inches apart, and thrives, also, either in woodands or grassy places. The leaves are narrow and grasslike, arising from a corm-like structure one-fourth to one-half inch in diameter, and is hard to find when not in bloom. The flowers are scentless, small, yellow, six-parted and look straight up. Their total height is about six inches. Although related to the amaryllis, it is perfectly hardy.

Transplanting is easy, fortunately. If a small ball of soil is taken it may be done at any time of year, provided the plants can be found. Propagation may be

accomplished by sowing the black, angular seeds as soon as ripe in a pot of light, sandy soil covered with a piece of glass to prevent drying out. Then the seedlings may be transplanted to flats for further growing as soon as they can be handled. Scattering the seed directly in the wild is a waste of effort and seeds.

Meeting Scents, Simples and Sunday Posies

By ROBERT C. BAUR

Illustrated by William H. Budge

BACK in the days when most of Sunday was spent in church, a portion of the herb garden was planted for the family's spiritual nourishment. Abiding by the Biblical precept that herbs grow for the service of man, early Americans kept the Sabbath with a variety of nibbles, scents and simples. "Meeting Seed" these church-going herbs were called because they sustained the faithful during the tedious hours of worship.

Nibbling was permissible during the sermon, providing appetites were confined to such nibbles as could be carried in pocket and kerchief. The Children of Israel likened the heavenly manna that fed them to coriander seed. Coriander grew in Colonial gardens, and seed of this annual was manna that helped our forefathers to retain the Word during the long Puritan Sabbath.

It was meet and fitting that calamus should enter the sanctuary, for Moses blended sweet calamus with cinnamon, cassia and myrrh to make an oil of holy annointment. Too strong for extensive eating, the aromatic roots made pleasant nibbling. In the fall when the roots shrink the least, great-grandmother candied flagroot for a Sunday treat. After continuously boiling the roots, she cut them into slivers and boiled them with sugar and just enough water to make a rich syrup. Children were fond of candied flagroot, although it must be admitted they preferred its sugar coating to the medicinal-tasting root.

Sermons lasting from two to five hours were an ordeal for both young and old. How impatiently the children watched the minutes trickle away in the great brass-bound hour-glass. When their squirmings became distracting, mothers produced their bundles of "meeting seed." These bunches of herbs had a soothing effect, for the outdoor sounds were not as inviting with a fistful of seeds and fragrant leaves to nibble and explore. The Sundays of Puritan children were often brightened by anise, caraway and dill, handed over the pew by some kind-hearted neighbor.

Rose hips gathered along the snowy path to church made pretty playthings. When the warmth of little hands thawed the crimson haws, they became a delightful sweet. Boys found the fruit could be mouth propelled to annoy an enemy seated across the aisle.

Segregated from their parents, those wretched boys (as the Duxbury elders called them), suffered in silence under the watchful eye of the tithingman. The mouth-melting galls of the pink azalea were a refreshing treat when thoughts wandered to quiet pools where the brook trout lay. May-apples, as these peculiar green growths were called, blend so well with the spring foliage that only the sharp-sighted can find them.

A surplus of May-apples could be slyly traded for slippery elm. The mucilaginous inner bark of this elm provided hours of chewing pleasure for the younger members of the congregation. Chewed untiringly, the wad was replenished until jaws were stuffed with the juicy cud.

Spruce gum was another Sabbath consolation, but only for those willing to climb for the aromatic resin. Pockets of sunflower and pumpkin seed also administered to the temporal needs of Puritan youth.

The presence of Jack-in-the-pulpit did not contribute to the spiritual welfare of the congregation. Disguised as a bit of dried apple, youthful jokesters delighted in slipping slices of the acrid turnip to their neighbors and watching them squirm. "Preacher Jack" was thereafter known as memory root to the victims of this Sunday prank. Unpleasant, indeed, were recollections of a fiery mouthful, suffered at the hands of a treacherous friend.

If misconduct during worship merited a whipping when the culprit reached home, the unhappy lad had only to recall the advice of Pliny; "That whosoever taketh the seed of rocket before he be whipt, shall be

so hardened that he shall easily endure the pain."

Early farmers prided themselves that two men and a team could raise a rod of stone wall before sundown. Yet, New England's boundaries were not laid without innumerable accidents. Many were the husbandmen who met their Sunday obligations, their aches and bruises soothed by buds of the Balm of Gilead poplar, boiled and mixed with mutton tallow.

Unaccustomed to Sunday sitting, these hard-working Yankees had their troubles trying to keep awake. Saint and Stranger were not spared, and a snore from the congregation announced that the forces of evil were at work. There was little danger of falling asleep in the unheated meeting house in December, but parishioners fortified themselves with anti-soporific herbs to keep from napping on sultry summer mornings. The sternest deacon was not too proud to sniff of fennel when he felt himself slipping. It was better to take precautionary measures than suffer the humiliation of a rap from the tithingman.

The hiccough, unpardonable of Sunday sins, was likely to be interpreted as an overfondness for hard cider. To prevent this calamity, the leaves and seed of dill were nibbled. Gerard lists dill as a cure for hiccough, and the Reverend Cotton Mather suggested its use, possibly with his own flock in mind. He was noted for lengthy preachings.

In places where the prickly ash grew, there was no excuse for missing church because of toothache. The lemon-scented bark of this citrus tree was balm that soothed the irritated molars of the early settlers. The berry, which was also used for toothache, has an anesthetic effect upon the nerves.

Sassafras leaves, newly unfolded into thumbs and mittens, were chewed to promote the flow of saliva. Better to have been with the Psalmist in the dry and thirsty land, than to crave a drink of water during the sermon. There was no hope for relief until the preacher stopped for the nooning. Churchgoers no longer rely on sassafras, but fire-fighters and thirsty woodsmen resort to the leaves in emergencies.

Remember the old fashioned horehound candy? Children usually thought of it on Sunday morning when there would be a minor epidemic of coughing, just enough to convince Grandma that a few of her candies were needed for church.

Wintergreen was one spring tonic to which no one objected. "Pippins" as the tender leaflets were called, were so popular for sermon snacking that, came leafing time, the entire congregation smelled of wintergreen. Chewed for indigestion, "pippins" settled the stomach after a hearty breakfast of baked beans and minced pie. Elderly ladies were fond of the waxy berries, especially those that survived the winter foraging of squirrel and partridge, for they are juiciest after lying beneath the snow.

The dried leaves of basil, sage and betony were snuffed to cure headaches, and mint was inhaled to clear the vapors. Many "old timers" believed that a buckeye in the pocket would keep the rheumatism from their joints during the Sunday sitting.

Among the Old World superstitions that were brought to America, was the belief that seeds of herbs bearing yellow flowers were protection from witches' spells. It is likely, during the infamous witch persecutions, that superstitious people went to meeting, bearing, "trevoil, vervain, Johnswort, dill, to hinder witches at their will."

Lavender, thyme, and other sweet herbs blended into an incense appropriate to the Lord's day. Marjoram was a fitting Sunday herb, as many botanists believe it to be the hyssop so frequently mentioned in *The Bible*. Picked enroute to church, such aromatic native plants as bayberry, bergamot, sweet fern and spice bush, turned the meeting house into a sweet-smelling potpourri. Not only was wild ginger a remedy for snakebite and whooping cough, but the essence of spring in the upland woods could be savored by knotting the root into a handkerchief.

Leaves of sweet-smelling herbs marked favorite Psalms and scriptural passages. Bible leaf, as the soft textured foliage of costmary was known, made the perfect bookmark. Having served to find the sermon text, the leaf was nibbled or crushed for its mint fragrance. Bible leaf did not spend all of its time in church, for one of its earlier names was alecost, because the leaves were steeped in ale to give it a tangy flavor.

Although John Josselyn, a Seventeenth Century English traveler, reported that southernwood was no plant for this country, it eventually spread to every other New England doorstep. Among the first herbs to arrive in the New World, the scent of southernwood was a link with the old life for many wilderness homemakers. Churchgoers picked it to such an extent, that in some localities it was known as meeting herb. Even Sunday homespun smelled of southernwood because housewives strewed their cupboards with its leaves to keep out moths.

Each spring, the preacher was obliged to remind the young folks that their flirtations were ill suited to the

House of God. This did not prevent marriageable maids from slipping southernwood into their Sunday shoes, in the belief that the plant would bring them face to face with their future husbands

Of all the Sunday scents, there is none as unforgettable as sweet shrub. Botanically labeled *Calycanthus floridus*, we know it as Carolina allspice, or strawberry bush. Throughout the South, where it grows wild, it is simply called "the shrub." The unusual garnet-colored blossoms were also called "shrubs" by Sunday sniffers, who crushed them to enjoy the fragrance of strawberries and ripe pineapple during the hours of devotion.

Tansy was also carried, although some found the odor repulsive because of its association with death. Coffins were once strewn with its buttonlike blossoms and acrid leaves, and one of childhood's unpleasantest chores was gathering tansy to take to the house of mourning. Tansy has escaped from the herb garden and the disagreeable use as a death scent, and has made itself at home among our wild flowers.

Outstanding among the old fashioned scented herbs were the sweet-leaved geraniums. Smelling of lemon, rose, mint and nutmeg, there was a geranium scent to appeal to every churchgoer. Lemon verbena was another favorite. Brought from Chile by clipper ship, it soon found its way into the meeting houses.

As Sunday habits became more stylish than comfortable, corseted ladies kept from swooning with sweet bags stuffed with rose geranium, sweet fern and bay leaves. Lavender fans, which emitted a delicate scent as they caught the breeze, were made by stitching strips of muslin to dried lavender stalks.

The installation of the wood-burning stove caused other discomforts. Parishioners sitting close to the iron monster became ill from the heat and smoke, requiring a sniff of sweet fern or lemon balm to restore them to health.

Spring bodices were often brightened with tussy-mussies. Do not reach for your dictionary as you will not find this tongue twister, which is a forgotten English term for a posey of blossoms and fragrant leaves. A tussy-mussy of clove pinks, southernwood, and Bible leaf, was not too frivolous for Puritan dames to carry to meeting.

During the past century, the first Sunday rose and lilac was a sign of summer. Thoreau tells of walking to Concord Church with other young men of the parish, each carrying a water lily. Gathered when the boys took their Sunday morning bath in the farm pond, there was great rivalry over the longest stems.

Token of gladness and marriage vows, rosemary was clutched in the trembling fingers of the bride. It was the duty of some member of the family to entwine a few sprigs of rosemary in the bride's bouquet, to remind her of her former home and loved ones.

Contented bachelors in England's border country wore lilacs on their Sunday lapels, to let the female wolf pack know they had no intentions of settling down.

The increase of public speaking and other social activities, shortened sermons, lessened the need for scents and simples. American cooks have become herb conscious and a place is being reserved for seasonings in the backyard garden. Marjoram, thyme, basil and other old favorites, basking in their return to popularity, can recall the green years when they were a pious lot and went dutifully to church each Sunday.

Rescue on the Shore

By BERTHA H. DOUGHERTY

As I went to sleep, banging shutters and sucking, roaring winds drummed in my ears. Next morning Tip and I dashed to the shore of our lake. Colors sprang at you; blue above, green water, and wet brown sand. Bits of white shell and pebble had washed on the beach and lay in foaming scallops along the shore. Something shimmered on a half sunk log. A monarch butterfly lay half in, half out of the sand. Near it fluttered tiny, bright yellow moths like buttercups, caught in the pebbles. I saw hundreds of half-dead insects all about. One huge Luna moth, with shattered wings, struggled and lay still as I watched. The night wind had swept them from the forest, into the water. Waves had tossed them back on the sand.

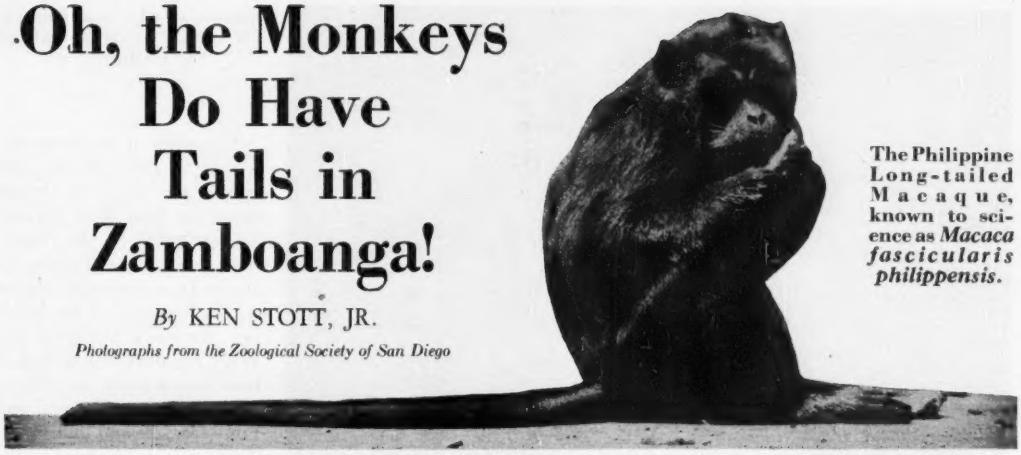
The dog stood stiff beside me. A breeze stirred the tawny hairs along his back and tail. An idea was born. I collected handfuls of the small, wet creatures and laid them along his coat. He was soon covered with

wings, like a fluttering garment. We walked slowly back to the woods. Tip stopped at a sunny hollow and I untangled the butterflies from his hair. I laid them on moss and branches. Here, there, in dozens, wings spread, color brightened, strength returned. With a flutter or two they were off. They danced a bit and were lost in the branches of the tall pines.

Oh, the Monkeys Do Have Tails in Zamboanga!

By KEN STOTT, JR.

Photographs from the Zoological Society of San Diego



The Philippine Long-tailed Macaque, known to science as *Macaca fascicularis philippensis.*

ONCE and for all, the matter was settled. Obviously the song was wrong. This was Zamboanga and they *did* have tails, conspicuous ones at that! In fact, from the mammal guide in my kit, I learned that their vernacular name, more accurate than many, was "Long-tailed Macaque."

They were seated along fifty feet of a gnarled, orchid-matted branch high above, and they brought to mind a full balcony of ladies at a home economics lecture. Wide-eyed, they watched the process of jungle-clearing with a fascination that should have been gratifying to our crew of Moro laborers. Every move was observed appreciatively, and, at each resounding blow of the axe and each *swackkk* of the machete, they chattered among themselves and nodded in what seemed to be whole-hearted approval. All that was lacking was an occasional question from the floor, or a hearty round of applause.

In the ensuing months we were to come to know this little band well, for they were with us daily — not from dawn to dusk, by any means, but at least once each day they would pay us a visit, mainly out of curiosity but partly, perhaps, to inspect our progress. After the initial land clearing, they followed with unfailing interest the laying of the coconut-log foundation, and, later, the erection of the laboratory-barracks building itself; the rounded metal frame with its corrugated roof and the window-screened sides and ends.

While the expanses of wire screen were intended primarily for ventilation, they served in a capacity that seemed to us of equal importance — optimum visibility. Even as we worked at the laboratory tables, bent over microscopes or racks of inoculated test-tubes, we had only to raise our eyes to witness the unfolding of a drama in which action never lagged and variety never ceased: "Mindanao Wildlife in Review — Laughs, Tears, and Heart-throbs in the Philippine Jungle, Cast of Thousands."

Parrots and cockatoos screamed by in straggling streams, and flocks of munia weavers descended upon our clearing like locust swarms. Sunbirds, red or green or cobalt blue, flashed through the vegetation like animated jewels. There were mynahs with rose-colored wattles, and now and then a crimson trogon or a fairy bluebird. Back in the depths of the jungle flying lemurs flitted like shadows from one great tree to another, and wild boar families rooted on the forest floor. Sometimes deer with nervous, searching ears and twitching tails watched us from a distance. But the stars of this colossal production, this titanic spectacle, were unquestionably the macaques.

There were about thirty in the clan — four adult males, fourteen or fifteen mature females (about half of which had young), and the rest were juveniles. The largest of the lot was the "dominant male." He was a veritable despot. His word, even his glance, was law, and *nobody* dared dispute it. He was arrogant, often petty and ever tyrannical, yet somehow these scarcely commendable qualities added up to a magnificence that commanded admiration. We came to call this tawny-coated dictator the "Old Man."

Usually when the troop moved through the forest, it was he who took the lead. But when there was possible danger behind, he would run quickly to the rear of the group, hurrying his flock onward and stopping now and then to hurl threats and insults at whatever creature was the cause of the disturbance — a native, perhaps, or a leopard cat, or even the fierce monkey-eating eagle, whose name indicates the number one item on its list of dietary preferences. Snarling and snapping in staccato grunts, the Old Man would perch on a branch (overlooking the intruder, if possible) and shake the limb until its leaves danced.

He had a variety of menacing expressions, each of which achieved perfection, as if he had spent many hours before a mirror rehearsing. There was the scowl, with brows jutting low over the eyes and lower lip protruding far beyond its mate. Then there was the yawn — an ideal manner in which to expose his gleaming ivory fangs fully and at the same time to express a

Enemy of the macaque is the monkey-eating eagle of the Philippines.

supreme and contemptuous confidence in his prowess. But his favorite mien was one in which he pursed his lips into a hooting oval and raised his brows until they nearly disappeared over the back of his head, his eyes bulging all the while as though they might pop from their sockets.

The other males in the troop sometimes participated in this exhibition of facial threats, but the results were not so effective. Because their fangs were short, the threatening faces they conjured were often more comical than terrifying. But if the ladies of the group found such grimaces amusing, they never for a moment showed it.

They were modest little creatures — the females — retiring, relatively quiet, and dressed in coats of olive-green. Against an ever-shifting background of shimmering leaves, they could become invisible in a split second whenever it was to their advantage. They might be playing in plain sight on an exposed limb, but should the Old Man bark out his guttural warning, they could vanish in a winkling, yet in so doing never move an inch. Once they held their bodies rigid, they blended immediately with the tangled vegetation behind them. It was clearly a case of "Presto! Now you see me, now you don't!"

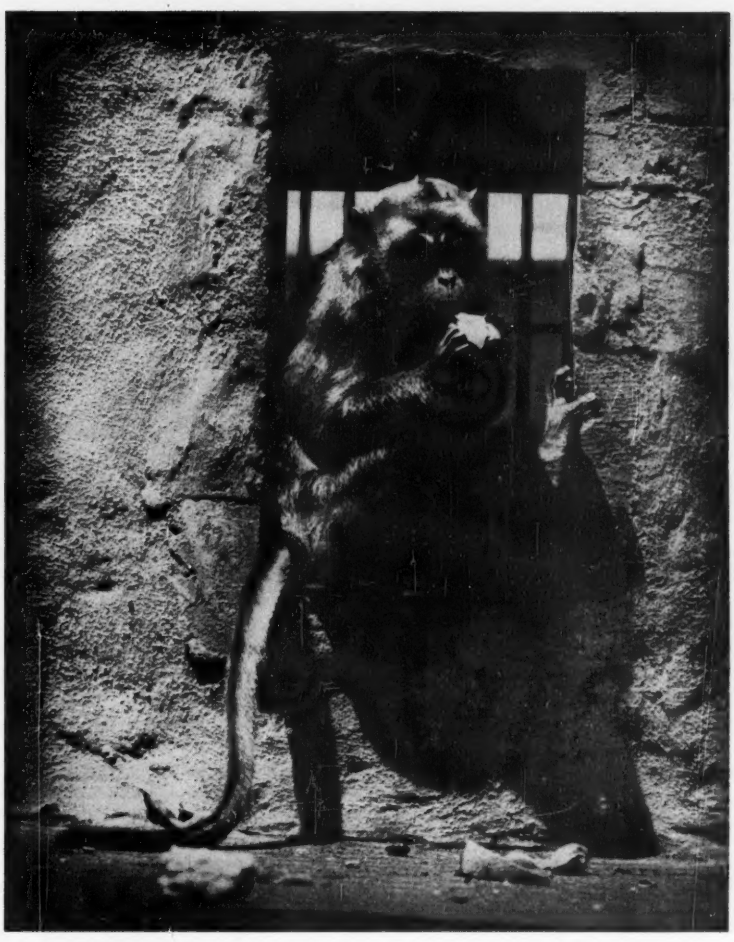
The remainder of the pack was comprised of noisy, quarrelsome brats, some half grown, others still clinging to their mothers. They screamed incessantly, except, of course, when the Old Man was finally tried beyond endurance. For hours on end, he would appear totally unaware of, or perhaps merely indifferent to, their ear-splitting chorus. Then suddenly he would stomp through the squalling group and cuff them right and left, sending them whimpering back to their mothers.

The monkey troop was active at all times of day, and even after dark we would sometimes hear them chattering excitedly in the forest. Once, in the dead of night, we awoke to a deafening clatter on the iron roof of the building. It was a terrifying din, as if a regiment of demons had been loosed upon us. There were screams and grunts, and tinny footfalls and dull thuds. Then, as suddenly as the monkeys had come, they stole off into the forest. Another night, they raided the shed in which we kept our food supplies. We wondered if they ever rested.

Throughout the day, they moved slowly through the trees about the clearing, feeding as they went. They sampled crisp new leaves and brightly colored blossoms, and once we saw a lone macaque sitting unperturbed in the midst of a swarm of bees, snatching them one after another and stuffing them into its mouth. However, the food that appeared to be the mainstay of their diet was a small, pithy wild fig that abounded in the jungle. To us these fruits were hard and tasteless, with an unpleasantly puckery quality, but the monkeys and other forest creatures seemed to find them highly delectable. Often while the monkey troop was feeding in the lower portions of a fig tree, the verdant canopy above would teem with hornbills and parrots that gobbled the fruits down as fast as they could. But in any display of sheer avarice, the macaques were unparalleled. They would cram figs into their mouths until their extensive cheek-pouches, which served as temporary storage containers, would bulge to the bursting point. The general effect was that of mumps in epidemic proportions.

Along the coast, the same species of macaque often fed on crabs among the mangroves, a trait that has earned them a second common name, "Crab-eating Macaque." In such locales, they also eat shrimps and mollusks, and elsewhere in their wide range, which includes Malaya and Indonesia, they are said to consume quantities of seed and grain.

Early one morning, the Old Man led his brood to a tree at the edge of the clearing, and, when we had trained our binoculars upon the troop, we discovered that "something new had been added" — a tiny, almost hairless infant that clung fast to the furry, upside down cradle of its mother's body. Its eyes were closed



This macaque had a wide variety of expressions and a great curiosity.

and it kept its screwed-up, prunish little face pressed tightly against her abdomen. We named the baby "Sumaya" after the leader of our crew of workmen. There was nothing deprecatory in the comparison; we liked Moros in general, and our venerable foreman especially, but he, too, had a wrinkled, shrivelled face.

Sumaya, the macaque infant, became a sort of godchild to us, and we followed "his" development with an interest that was definitely proprietary. We began to keep track of the movements of the monkey troop with renewed enthusiasm, and any observation, however trivial, concerning the baby became at once an important topic for discussion.

At first Sumaya moved little, shifting position only when nursing time came around. But as the days slipped past and a coat of sparse, blackish hair sprouted over his body, he began to indicate an awareness of what went on about him. The hollow, resonant trumpeting of a *Calao* hornbill, or the rollicking call of a stork-billed kingfisher, would cause him to turn his wobbly head towards the source of the sound, and the activities of his clansmen held him spellbound. He, in turn, held a certain fascination for them.

He was an attractive little mite, and the other monkeys in the troop, particularly those mature females currently without young of their own, recognized his appeal. They examined him carefully and frequently, and often sat close by the mother as she groomed his fur, removing flakes of salty skin or bits of dirt with her fingers or her lips. Sometimes, when she turned her head, one or two of the other ladies would reach around her to grasp the baby by his tail, a leg or an arm, or even his head, and try to snatch him from her, so great was their desire to share in his rearing and education. The resulting tug-of-war was usually pandemonic, but despite its intensity the mauled object of their affections never seemed to emerge the worse for wear.

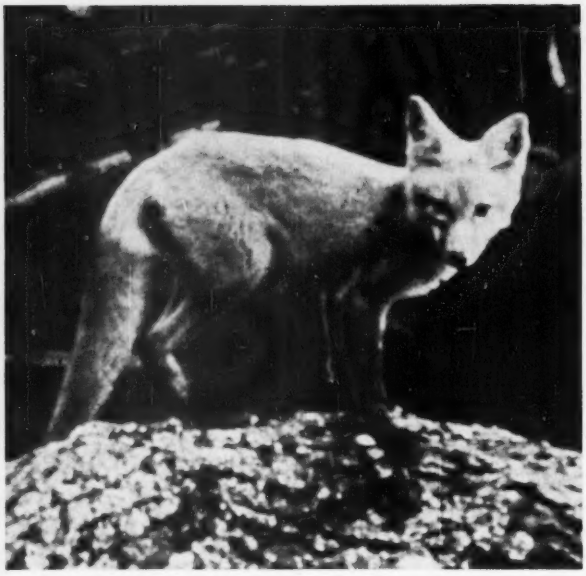
Sumaya's education was a gradual affair, and one in which at first he declared his unwillingness to cooperate in no uncertain terms. It was time, his mother had apparently decided, for Sumaya to "test his wings." Up to now, his hands and feet and limbs had been used only as a means by which he had remained attached leech-like to his mother's underparts. Now, he was to learn their real worth.

When first his mother pulled him gently but firmly from her breast and held him at arm's length, dangling in mid-air, we interpreted his reaction as one of incredulous surprise and horror. How could she who had borne and nursed and cared for him mistreat him so? He screamed and pleaded, terrified that his mother might let him drop, and in a frenzy he clutched her arm with his puny hands. His long straight tail lashed the air helplessly. In Old World primates, the tail is used strictly as an aid in balancing; only with New World monkeys is it prehensile.

Straining against the pres- (Continued on page 442)

Fun with A Red Fox

By J. MURRAY HOLLISTER



THE common, or eastern, red fox, is considered to be a wild, shy animal whose main idea is to raid the hen roost, who sleeps in the middle part of the day, hunts for food in the hours of twilight and darkness, and feeds irregularly.

My experience with an individual of this species in mid-August at a small lake in the Green Mountains of Vermont, where I was vacationing, indicates that this animal may be regular in feeding, and come to the same place daily in broad daylight. I saw him first while fishing from a boat on the lake. He was following the shore line, evidently seeking food.

My first thought was to get a kodachrome picture of him. I assumed that he was hunting for frogs, but found that while frogs were not plentiful, minnows were. To bring my subject out of the woods to a certain spot at a time of day when the light would be sufficient for a picture was the problem. At least it was worth trying. A survey was made of the shore line, and logs extending into the lake were located. At 10 A.M. every day for two weeks I placed dead minnows, freshly caught, on one of the logs. For a time I watched the fox from the boat; afterward from a concealed spot near the log; then on a stump in plain view near the bait. To my surprise he would come for the fish and pay little or no attention to me, if I kept quiet. At one time he pulled on the fishy rope that fastened the boat to a stump while I sat on a log, five feet away. Again he passed me on a log within easy reach as I sat on a stump. At first he came for the minnows at about 11 o'clock, but soon came earlier. In a few days the meal was taken at 10:30, and later, soon after it was placed on the log. It is my belief that he was waiting to be served. Did my red fox reason from cause to effect? No one can be sure, but at least his actions indicated a process of thinking.

★

Have You . . . . .

By CARSTEN AHRENS

Watched the wind make patterns through
a field of ripening grain,
Watched the netting of lake water neath
a sudden autumn rain,

Known the friendliness of coffee
sturdier than any wine,
Known the tang of bacon frying high
above the timber-line,

Smelled a breeze that has been blowing
through the locust blossoms white,
Smelled the odor of a pine wood on
a damp and misty night,

Heard the wren's notes come cascading
down a rocky canyon's wall,
Heard the hope that's so apparent in
a meadowlark's clear call,

Felt the spirit of the river 'gainst
your paddle's steady stroke,
Felt the pull of blazing campfire with
its curl of blue-gray smoke,

Have you? Then all the man-made wonders
will gnaw at you in vain;
You're part of God's great out-of-doors;
the sun. . .the wind. . .the rain.

Bald Cypress

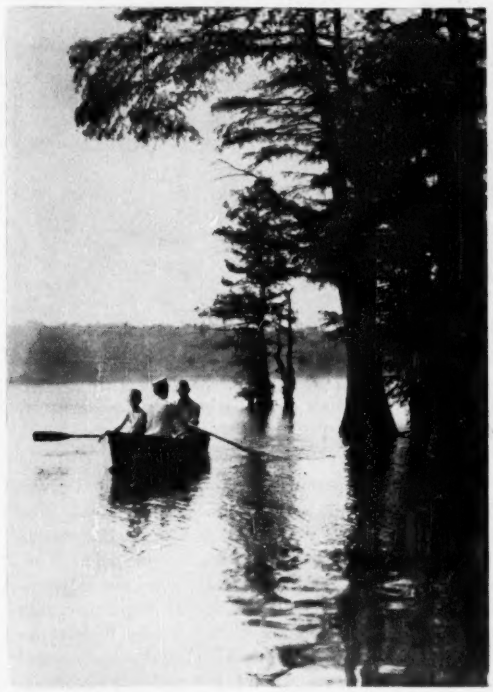
By WALTER S. CHANSLER

THERE is an area in the extreme southwestern part of Indiana known as "The Pocket" in which the flora is more diversified than in other sections in this part of the country. Besides the plants that commonly occur throughout the State, one finds here some species not appearing elsewhere in this region. Among these is the bald cypress, known scientifically as *Taxodium distichum*, one of the most valuable of the American timber trees. This is the extreme northern limit of its range in the Mississippi Valley, although it is found in various Atlantic coastal areas as far north as Delaware; and transplanted specimens grow as far north as New York.

The bald cypress is a beautiful and distinctive tree. When growing in wet, swampy soils in virgin forests, it not infrequently attains a height of one hundred and sixty feet, with a trunk diameter at waist height of eight to ten feet. Such trees usually grow straight and columnar, sometimes producing clear boles of sixty feet or more to the first branches. This is true of many of the cypresses growing in Louisiana and Florida, the two leading cypress lumber states. However, not a few of the older trees are ragged and unsymmetrical; others have flaring branches that spread as much as seventy-five feet; some are forked or misshapen, and many of these trees are hollow at the base. Young trees, especially when standing alone, have a beautiful, pyramidal symmetry, which makes them desirable for ornamental planting in parks and public grounds.

The fluted, buttressed bases of these cypresses show well the flaky bark and manner of growth of this tree.

It is in the deep South that the bald cypress attains such growth and perfection as to make it a most outstanding tree. There grow the largest specimens, usually in swamps, where they are often interspersed with "slash pine," swamp bay, sweet gum, and other water-loving trees. Indeed, many of the swampy areas of the South that are submerged most of the year are so dominated by this tree that they are known as cypress swamps. Not a few of the cypresses that grow in these swamps have wide, buttressed bases with fluted outlines. Spirelike projections often develop on the roots of such trees. These are known as "knees." These sometimes grow to a height of eight to ten feet when fully developed, which not infrequently puts them well above high water level. Scientists believe that these knees act as aerators, although their function is not definitely known. Such trees frequently form more than a considerable part of the forest growth in many swampy areas, where they spread their pea-green foliage above the stagnant water, forming a canopy through which sifts the feeble rays of sunshine to fashion patterns of



Cypress growing at Hovey Lake, in southwestern Indiana. This is the extreme northern limit of its range in the Mississippi Valley. Cypress trees love to grow with their feet in the water.

light and shade over the tangle of undergrowth.

The foliage of this tree consists of small, narrow, yellowish-green leaves that are spirally arranged on long curving twigs. These form loose, light, feathery sprays on the rather stout and horizontally spreading branches, which gives the tree a cedarlike appearance when seen from a distance. The foliage is usually relatively light, readily agitated by a faint breeze, and in autumn turns orange-brown and sheds itself. Usually the tender twigs that bear this foliage are shed along with the leaves. Numerous purplish staminate flowers, borne on long drooping panicles, and small clusters of pistillate flowers at the ends of the twigs of the previous season's growth brighten the foliage in summer; while globular, woody seed-cones, appearing, usually in pairs, at the ends of the branches, peep through the browning foliage of early autumn.

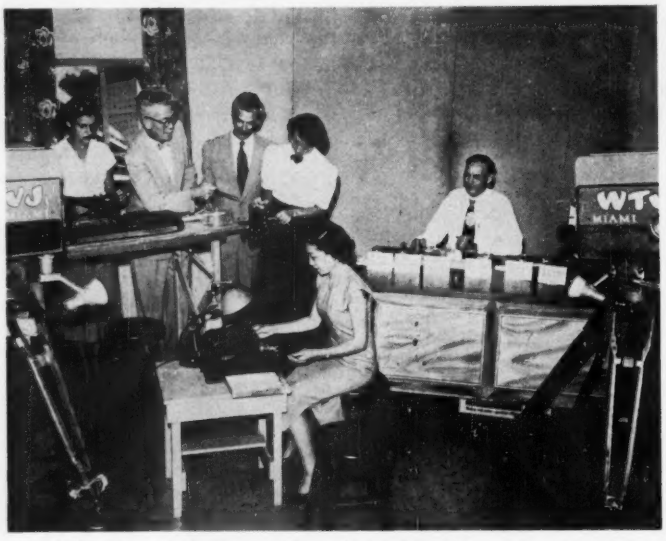
This species of cypress is moderately fast-growing and long-lived. Specimens of fair size show a reddish-brown bark with long fibrous strips peeling away from the trunk. Beneath this flaky bark is a thin layer of white sapwood, under which lies the valuable brown heartwood so greatly prized by the commercial lumbering interests. This wood is light, soft, straight grained, and easily worked. It is remarkably durable, even when in constant contact with soil or water, which makes it an admirable wood for use as fence posts or railroad ties, or for building boats. It is also much used for construction purposes, principally as doors and interior finishing of houses. Much cypress wood was formerly used in the cooperage trade and for making shingles, but since it is progressively growing less plentiful and more valuable, not so much is now so used.

Because of the extensive drainage of swamplands and the ever-increasing destructive logging operations, virgin stands of the bald cypress are fast disappearing. However, some few stands of young trees are still found in various parts of the South. These are most frequently met with in the more inaccessible regions, where logging operations are difficult. These trees cannot of course possibly rival the beauty and grandeur of the old rugged specimens of primitive growth.

Certainly such a beautiful and useful tree as the bald cypress deserves protection by tree-lovers everywhere.

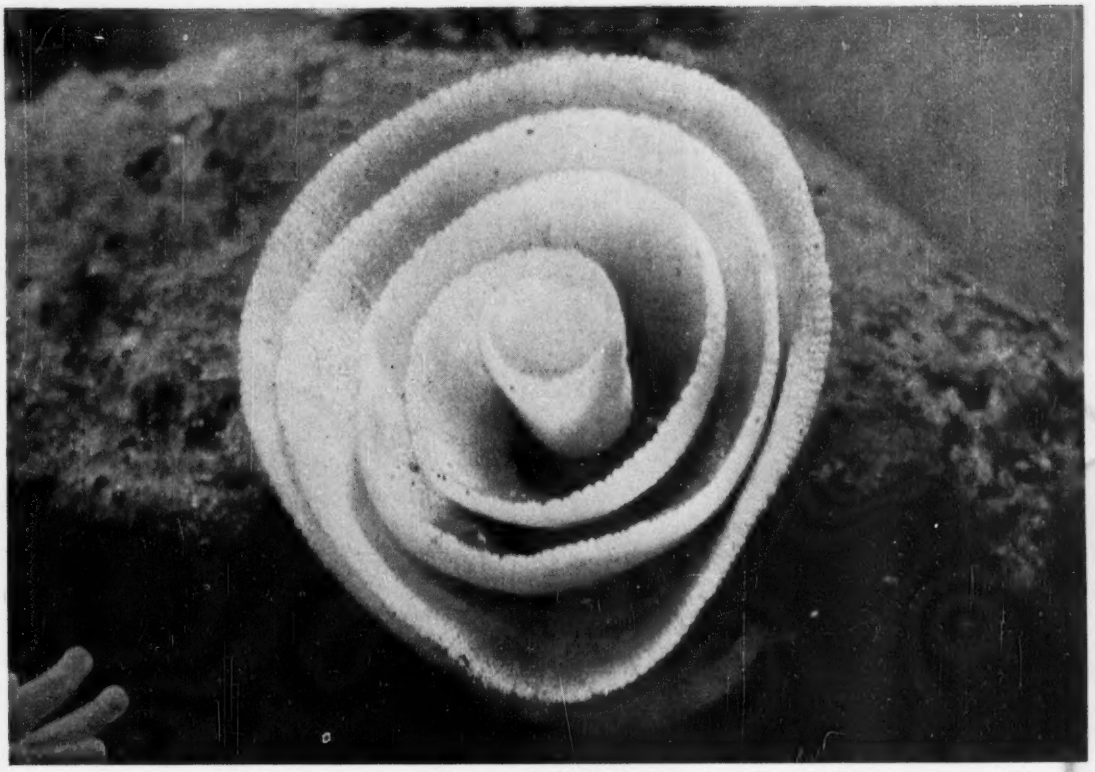
Microscope on Television

Now in its third year as a regular feature of Station WTVJ, Miami, Florida, the University of Miami's TV program, "Science Show Window," has amply demonstrated the possibilities of television as an educational factor. On a recent program Dr. Julian D. Corrington, Professor of Biology at the University and Microscope Editor of *Nature Magazine*, presented a successful microscope demonstration. With the aid of his assisting instructor and three students, he showed how animal tissues are cut in extremely thin sections on microtomes and mounted on slides. In the photograph of the TV show in action Mary Chen from Shanghai, China, in the foreground, is operating a rotary paraffin microtome. Judith Cohen, from Washington, D. C., at the left behind the table, is operating a rocking microtome. Dr. Corrington is pointing to the freezing microtome. Oliver Griswold, of the U. of M. Radio and Television Department, who conducts the program, watches Katharine Schafer, instructor, operate the freezing microtome. At the right is Murray Girard, retired from the Navy medical service, who is studying microtechnique for use in biological research. Mr. Girard shows impregnation of the animal tissue with paraffin.

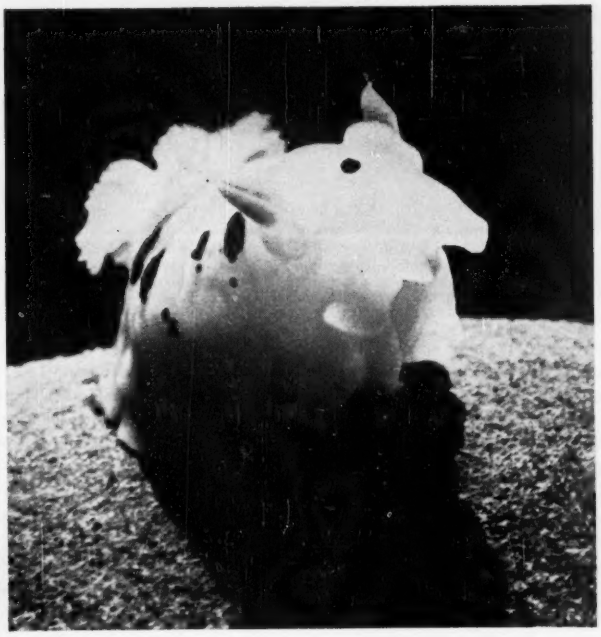


Dr. Julian D. Corrington and students from his course in microtechnique at the University of Miami demonstrate the preparation of microscopic slides of paraffin sections on television.

"Science Show Window" is produced by the University of Miami Radio and Television Department. The program rates high with south Florida audiences and is a pioneer TV university educational program. University of Miami television students learn not only production methods through on-the-air experience, but program planning and direction. During their training emphasis is placed on making science and natural history interesting and informative for mass audiences.



A closeup of *Diaulula* eggs showing the beautiful symmetry of the egg mass. Each species of nudibranch leaves a distinctive egg mass, and the presence of the marine animal is often first detected by seeing these masses on rocks, marine plants, or, even, on hydroids. Below is *Diaulula sandiegenis*, seemingly clad like a clown and with gills on its back that it can contract and expand at will. This creature is common in tide pools along much of the West Coast from San Diego to Alaska.



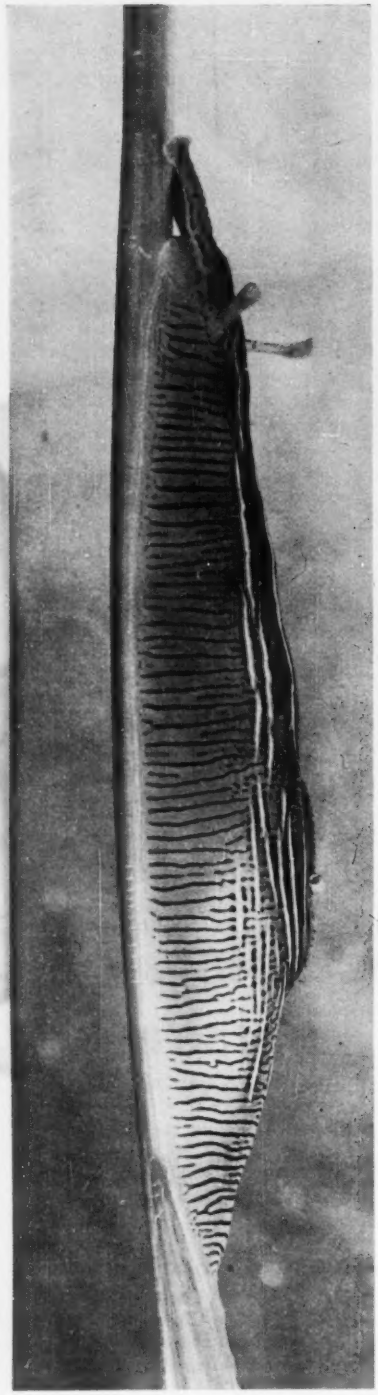
Sea Slugs on Parade

By M. WOODBRIDGE WILLIAMS

Photographs by the Author

ACROSS the ocean bottom, and through its vast extent, crawl and swim more animal forms than in any other habitat of the world. Among these hordes of creatures, which crowd one upon the other in the shallow waters, and inter-tidal areas of the sea, none are more beautiful, or more curious in shape and habits, than a group of naked snails called "nudibranchs." Sometimes they are simply dubbed sea slugs by the casual observer.

In general outline they do resemble the ugly terrestial slugs. They do slide about on a broad foot by means of rhythmic muscular waves, and both are mollusks, which, in a kind of parallel evolution on land and in the sea, cast off their shells, or reduced them to mere vestiges. Yet, zoologically, land



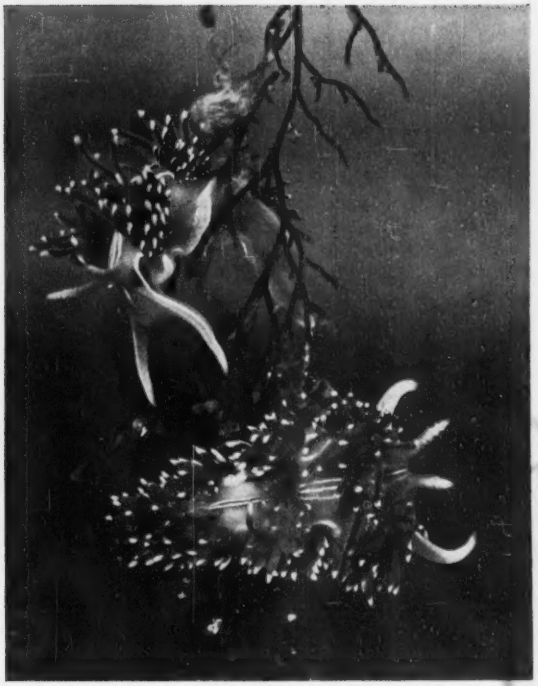
Phyllaplysia, a bright green slug that lives on bright green eel grass. The young crawl into the protection of young blades at the base of the plant. Like the sea hare, it is a tectibranch.

The sea hare, *Aplysia californica*, is a giant among Pacific Coast marine slugs. It often grows to be more than a foot long, and is found both in bays and on rocky shores along the outer coast. It is sometimes called an inkfish because it ejects a purplish fluid when disturbed. The tentacles suggest the ears of a hare, and are well shown above the eyes as this creature rears upward from amid a thicket of seaweeds.

slugs and sea slugs are quite apart. There certainly are no land slugs that carry on their backs a garden of bright-colored tubes used in digestion and defense.

Still, such nudibranchs, called "aeolids," are common in the sea. Along our shores they inhabit inter-tidal areas in tide pools, under rocks or on marine plants, and plant-like animal colonies. Their dependency on the sea as a home is best seen by lifting a specimen from some tide pool. The creature will collapse into a shapeless protoplasmic jelly.

Although helpless in the air, the mass, once it regains the sea, becomes an aggressive character that does not mind advertising its presence as it glides rapidly about, waving its bright-colored dorsal tubes, called "cerata." It feeds principally upon sea anemones and hydroids. The sleek creature browses rapidly through these animal jungles, nipping off the flower-shaped hydranths on the hydroids, or



At the left is the aeolid, *Hermissenda crassicornis*, and its spiral clusters of eggs laid on eel grass. The back of the animal is adorned with cerata that are tipped with yellow or red and contain nettle cells. These have been stolen from the animals the slug eats, such as hydroids or sea anemones. At the right is the same animal, one of the most gorgeous invertebrates in the eastern Pacific. It is common in shallow waters and its colorful markings make it conspicuous among the softer colors of the marine vegetation. It looks fairy-like but is a carnivorous mollusk. Here two of the slugs are feeding on the hydroid *Eudendrium*.

pieces of sea anemones. In this hunt, it not only gains sustenance, but also a protective battery of nettle cells, which were once the property of the victims.

These nematocysts, as they are called, remain undigested and undischarged in their passage through the aeolid. The digestive course is strange, for material passes through ducts from the stomach into the aeolid's tubular cerata, which act as a type of liver. At the tips of these bright-colored tubes, the nematocysts are also stored in small pockets, where they remain ready for discharge against an enemy, just as they were when embedded in the tissue of the original owner.

The cells are thought to eject their poison darts upon physical pressure against the cerata, or when the cerata are voluntarily shed in self defense, as a lizard sheds its tail. It is believed that the bright colors of the cerata attract attention away from more vunerable parts of the nudibranch. Most of the aeolids that possess stinging cells, also have bright-colored cerata.

When disturbed, these marine animals will hump up like a mad hedgehog, bristle the cerata and hide their heads. Aeolids also have a tendency to fight one another, and nip at other species of nudibranchs. With their red, yellow, blue, and even blue and gold color combinations, these aeolids and other nudibranchs are as conspicuous as neon signs against the less flashy green, brown and soft red plants in our temperate water tide pools.

One theory suggests that aeolids can afford such a showy display because they are not palatable, but a western naturalist of great curiosity gulped one down without injurious results. It may be borne in mind, however, that most naturalists have hardy constitutions, and a constant, all-consuming curiosity.

Some gay-colored nudibranchs lack such weapons as nematocysts, but a large group on the west coast, called "dorids," often have a conspicuous "fruity smell" that is nauseating when concentrated and may be another type of defense. These dorids carry a neat rosette of gills on their backs, and some of them, perhaps, even excel the aeolids in their concentrations of unadulterated pigment. In California one finds *Glossodoris californiensis*, which is ultramarine blue, with rows of bright orange spots, and *Triopha carpenteri*, which is white with orange-tipped appendages. *Hopkinsia rosacea* is an exquisite form in rose pink. Observers have probably been too tongue-tied in amazement at the beauty of color and form of these creatures to have described them with common names.

The tectibranchs, cover-gilled slugs, on the other hand, are often known by common names. They are not as showy as the nudibranchs, but often they are more conspicuous at the seashore due to their size and numbers.

In California, the sea hare grows more than a foot in length and can weigh several pounds. Unlike the nudibranchs it has a mantle that conceals a horny rudimentary shell. The creature is a vegetarian with three distinct stomachs for digestion and mastication of seaweeds. When disturbed in its sluggish habits, the sea hare emits a smoke screen of purple fluid that will dye a handkerchief, but the color is not fast. This excretion was once thought to be poisonous, and the ink from a Mediterranean species was believed to cause baldness. The fluid is now known to be harmless. In the Mediterranean sea hares are consumed by humans.

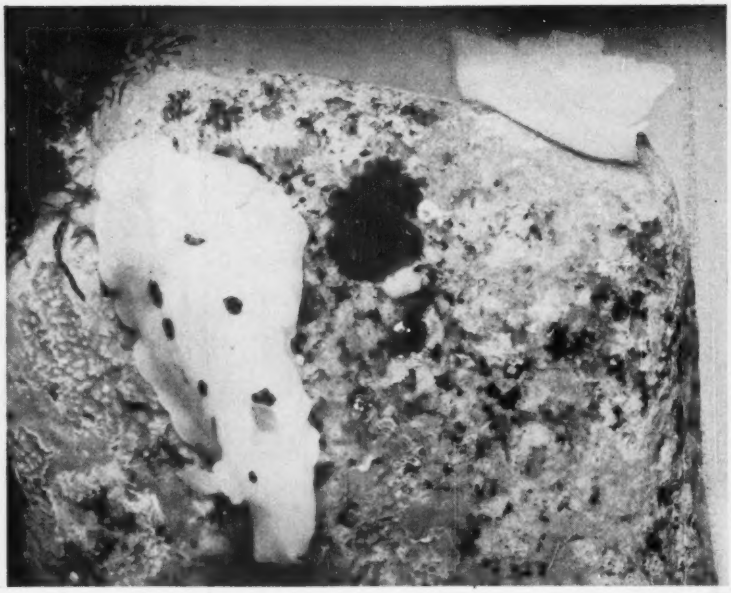
Some of the tectibranchs have not gone so far as to toss off

their protective shells. The large bubble shell, *Bulla gouldiana*, is one example, having an inflated thin shell, mottled brown and green.

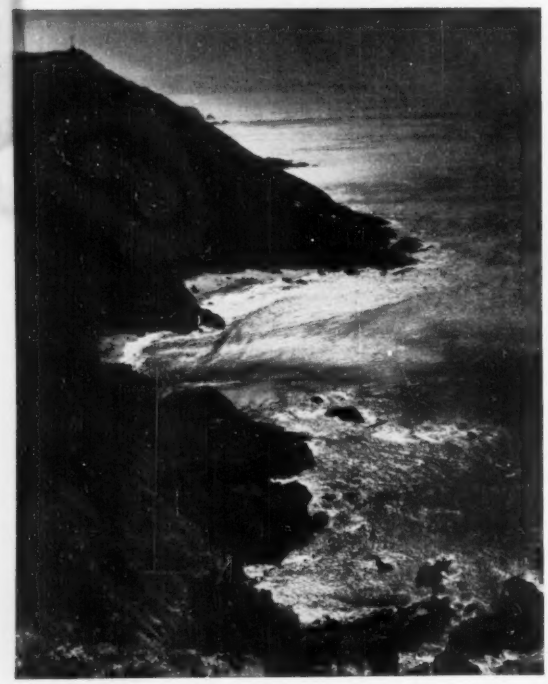
Slugs of all these groups leave their trade marks in the form of egg masses, distinctive for each species. *Hermissenda crassicornis* an aeolid armed with nematocysts, lays a twisted spiral mass of eggs, while many dorids deposit their clusters in concentric circles. Sometimes ribbons of eggs lie flat, sometimes they stand on edge. Often these eggs will be the same color as the adult. The small red dorid on the West Coast, *Rostanga pulchra*, lays neat coils of red eggs on a red encrusting sponge.

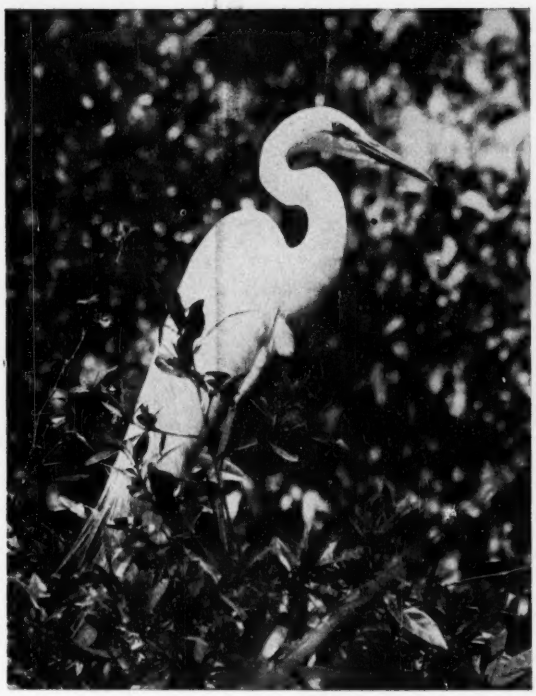
In contrast, the sea hare strings long, yellowish masses over rocks or other hard surfaces. One mass may contain close to one hundred million potential sea hares. If they all hatched, the seashore would quickly be overgrazed. But this cannot occur as did the epidemic of hares in Australia, where a terrestial species was introduced without proper controls.

Quickly after the larval sea hares hatch and swim off into the ocean, they are devoured by larger forms, so that only a minute fraction survive to settle on the bottom as miniature adults. Their destruction continues even then, but those that do persist crawl along with other types of sea slugs in search of crisp sea lettuce, *Ulva*, a hydroid colony, or sea anemones — all depending on their specific tastes, which are governed by several unique modifications of molluscan anatomy.



Above is *Diaulula*, pictured on the first page of this article. It has a rosette of gills on its back and a skin that feels like emery paper. The egg mass, also pictured in closeup at the head of this article, may be seen at the upper right on a rock encrusted with bryozoans and seaweeds. Lower left is the headland on Point Reyes, California, typical habitat of such sea slugs. The animals are found crawling on seaweeds in tide pools, or nestling from the pounding surf beneath rocks in the inter-tidal area. Below is a tectibranch of the genus *Aglaja*. It secretes a sheath of slime to travel over sand. It inhabits sandy bottoms of shallow water, where it lays a gelatinous egg capsule anchored in the sand by a stalk and shaped like the finger of a glove.





(1) Is this long-necked bird a great white heron, a snowy egret, an American egret, or a little blue heron?

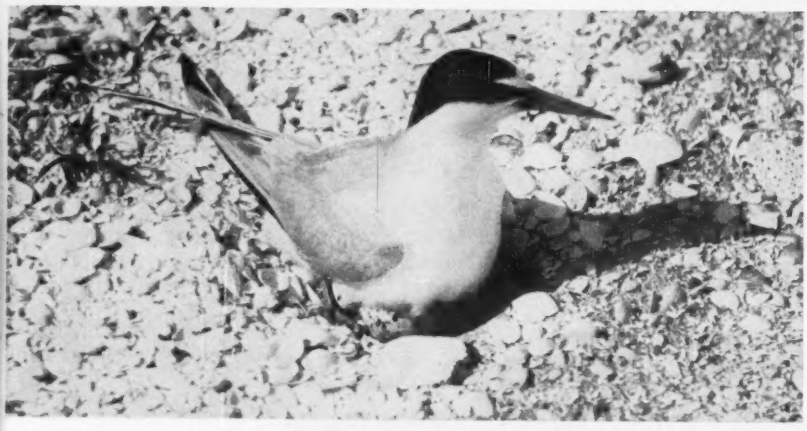
(2) Is this incubating bird a wood thrush, a brown thrasher, a curve-billed thrasher, or a long-billed thrasher?

A Bird Photo Quiz

Photographs by Hugo H. Schroder — Answers on Page 442.

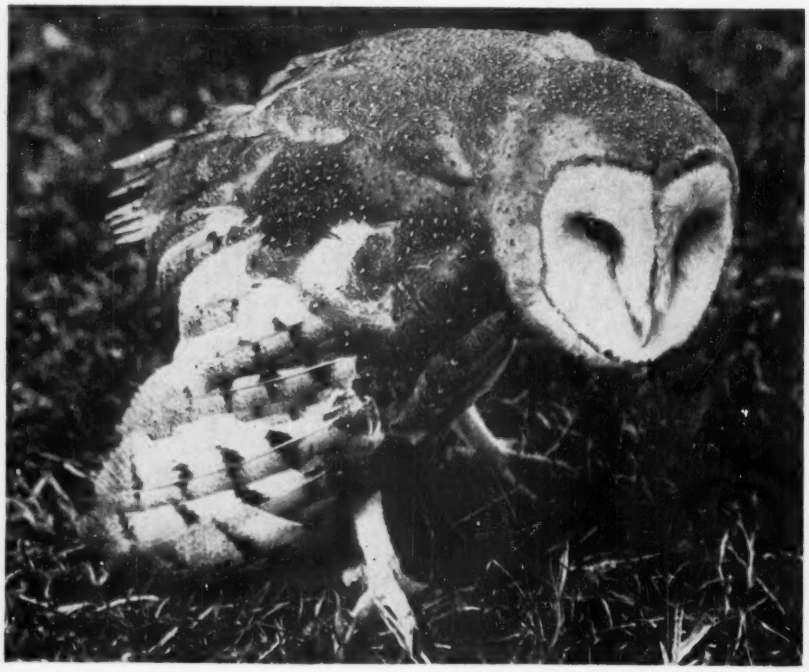
(3) Would you call this bird a baldpate, a gadwall, a wood duck, or a black duck?

(4) What is your guess? Is this bird (right) a reddish egret, a roseate spoonbill, a white ibis, or a black-crowned night heron?



(5) Is this dainty tern (left) nesting on the shell-strewn shore a roseate tern, a least tern, a Cabot's tern, or a Forster's tern?

(6) Is this defiant owl (right) a barn owl, a barred owl, a snowy owl, or a long-eared owl?

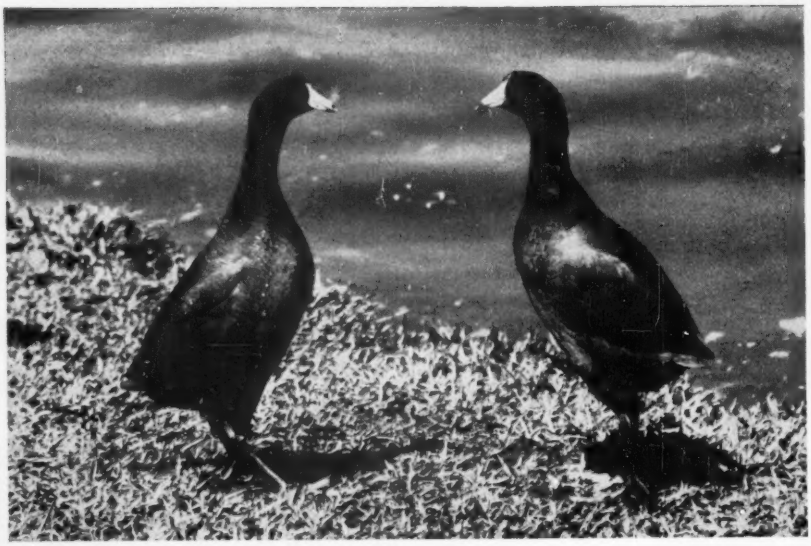


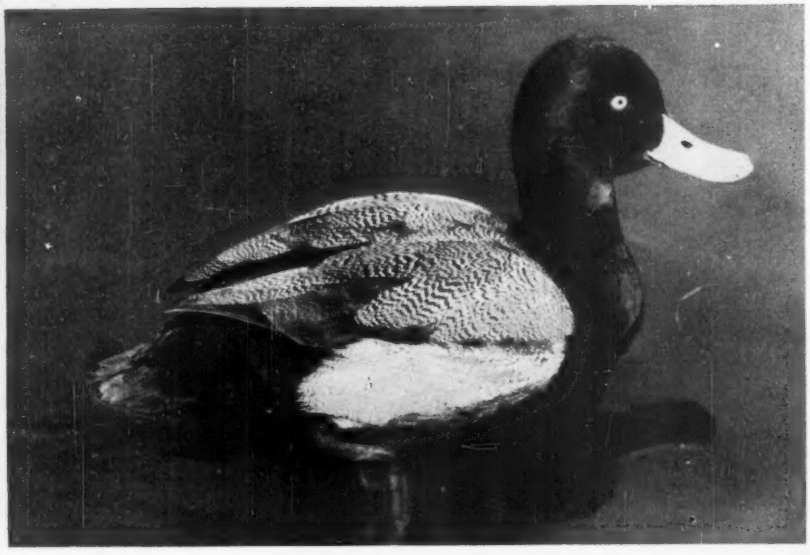
(7) What would you say the bird at the left is? Is it a ground dove, a white-winged dove, an Inca dove, or a mourning dove?

(8) Does the avian domestic scene at the right show a black-necked stilt, an upland plover, a Wilson's snipe, or an avocet?

(9) Is this bird perching on the barbed wire an Arkansas kingbird, a gray kingbird, a phoebe, or an eastern kingbird?

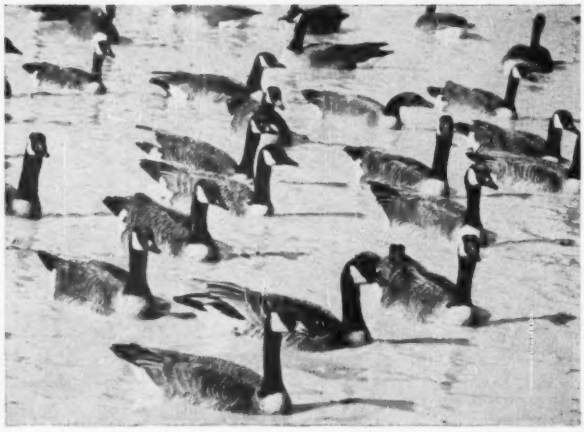
(10) Are these bird sparring partners clapper rails, king rails, coots, or Florida gallinules?

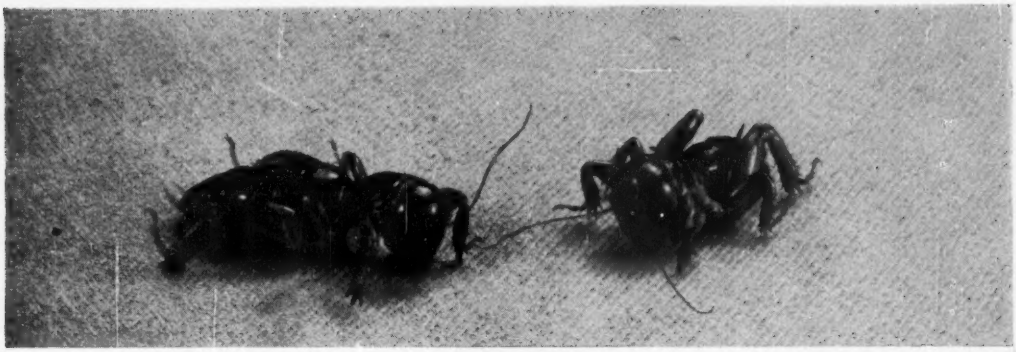




(11) Would you call this handsome male duck a canvasback, a lesser scaup, a blue-winged teal, or a green-winged teal?

(12) What species of goose makes up this group? Are they blue geese, white-fronted geese, Canada geese, or snow geese?





The Jerusalem cricket, *Stenopelmatus longispina*, is a wingless relative of the grasshopper and is commonly found in the far West, where it is also known as the sand cricket.

"Child of the Earth"

By MYRON R. KIRSCH

IN THE far western states one frequently encounters the Jerusalem cricket, a rather large, clumsy insect with a head that reputedly resembles the face of a human infant. Just when this imaginative analogy was first suggested is apparently unknown, although certain early Indians in northern California included it in their tribal lore. Usually such beliefs are short-lived, but this one became so firmly implanted and widespread that even today, among the Mexicans of the Southwest, the creature is known as the "nino de la tierra," or "child of the earth," whose presence in a home supposedly portends imminent disaster for the occupants. Despite this aura of superstition, however, the Jerusalem cricket, or sand cricket, as it is sometimes called, actually merits a niche in the insect world, if for no other reason than participation as a scavenger in the balance of Nature.

The name Jerusalem cricket is misleading because the animal is neither a cricket nor indigenous to Jerusalem. It is, nevertheless, closely related to the true crickets and grasshoppers, and is known scientifically as *Stenopelmatus longispina*, from its shielded back and long, spined legs. It ranges from Britsh Columbia through the western states into Mexico and is especially prevalent in California.

Unlike its cousin, the grasshopper, which has well-developed wings, the Jerusalem cricket is wingless and confined to the soil, where it burrows nocturnally in search of food. Moreover, while the grasshopper confines itself to a plant diet, except under certain circumstances when it will eat other insects, the Jerusalem cricket is omnivorous, relishing insects and earthworms as well as roots and tubers. Nor is it averse to devouring dead animal matter if such is available. Its fondness for potatoes has led to another title, potato bug, although in no way must the insect be confused with the better known and more serious pest, the Colorado potato beetle, *Leptinotarsa decemlineata*.

The Jerusalem cricket is a large-headed, robust, aggressive-looking insect, often reaching a length of two inches, having heavily spurred hind legs, short spines on a soft abdomen, and an inconspicuous ovipositor. At the end of the black-striped abdomen is a pair of short but prominent anal feelers, or cerci, which are sensitive to touch stimuli. As the animal burrows in the soil the anal feelers possibly aid in detecting danger from behind. In contrast to the blackish abdomen, the forepart of the cricket is pale amber-yellow and very shiny, as the photograph indicates.

Mating occurs in early spring, and during the spring months the female deposits her oval white eggs in small clumps in nest-like holes under rocks, pieces of wood, or in bare soil. Following the mating process, it is not unusual for the female to turn upon her mate and destroy him.

When the Jerusalem cricket is annoyed it puts on a bluffing act. Facing its antagonist, it displays a powerful mouth and produces a scratchy noise by rubbing hind legs against abdomen. Obviously this does not help an already invidious reputation. But, as time passes, perhaps the creature will lose its reputation as the hostile "child of the earth" and be accepted for what it really is, an innocuous insect handicapped by a startling appearance. Many a harmless creature needs only a better acquaintance on our part to prove its case.

The Twenty Dollar Pine, a dead hemlock beside it, at the right, new forest growth around the pine.

The Twenty Dollar Pine

By VIRGINIA S. EIFERT

Illustrated by the Author

THE BIG pine was slated to be cut next day. Most of the other big ones had gone down, but this one still stood in the deep snow of the Wisconsin winter when Sidney Fell tramped up to the foreman and had a word with him. The foreman looked surprised, then laughed:

"Sure, I guess you can have it for twenty dollars, but I can't see what good it'll do you to leave it standin'."

So Sidney Fell paid the lumber foreman twenty dollars for the tall white pine beside the Seven Mile trail, and when the winter sun went down behind the inky spruces to the west, the pine dominated the almost ruined forest.

There was a good deal of joking about the Twenty Dollar Pine. The school-teacher from Oshkosh probably was off his beam, they said, probably was one of the sentimental Nature fellows who sometimes penetrated the north woods and wanted to save the trees. Trees were for cutting. Ha!

But the Twenty Dollar Pine stood. Sidney Fell and his wife, Emma, had a plan, and they needed that pine to help to carry it out. For thirty years they had bought land at the edge of Nicolet National Forest; land which at that time was considered almost worthless after the lumber companies cleared out.

The plan was this: To hold against further devastation as much of the old forest land as was possible with limited means; to harvest it correctly; keep it safe from fire and over-cutting, and to preserve for coming generations the nucleus of a forest, which one day might return to its old quality of primeval wilderness.

Except for a few scattered spots, the virgin timber is gone. In the days of the lumber barons, the trees seemed to go on forever, and they were there for the taking. In the wake of the lumbermen, the ruined forest lay wide open to the sun, full of tinder-dry slash and birches, sun-burned ferns and bleaching moss.

But it does not take long for a northern forest to get its breath again and set about reforestation on its own account. Under the battered birches and aspens, which were not worth cutting, and which sprang up after the ancient trees were cut, balsams grow. In their shade spring up pines and hemlocks, until, in a generation, there is a flourishing forest. But if fire gets in and tears through the slash and devours the remains of the virgin forest, then the process of rebuilding is even longer and greater and more complicated. Yet fireweed, wild raspberries, aspens, birches, balsams, pines and hemlocks and hard maples, in that order, eventually come, and eventually the forest stands again beneath the bright sun of Wisconsin.

Now five hundred acres of privately reclaimed land contain once more the essence of a great forest. In the midst stands the Twenty Dollar Pine. The secret of why it is there, and why twenty dollars was paid for it, lies down that deer trail, which passes an old hunting shack at the edge of the cranberry bog, and moves in leisurely fashion into the Big Woods.

It is a well-used trail. Daily the deer and chipmunks and porcupines travel its easy contours through the woods to the old Seven Mile Trail, which parallels sparkling Seven Mile Creek, with the national forest beyond.

One follows in the footsteps of the deer. Their sharply imprinted tracks are pricked in the sandy trail, dug in hard when a deer was running, lightly marked when the deer was placidly grazing on the wintergreen that grows beside the trail. A porcupine rattles

awkwardly across the path and scrambles up into a hemlock. A red squirrel whirs and churrs and raises a racket, or, stretched full length on a sunny branch, takes a brief mid-day nap. The chipmunks all come out on their stumps and logs to chirp and watch as a human being, quiet on the pine-needled, sandy path, comes along.

Blue-headed vireos sing in the upper trees; a hermit thrush, quiet now in late summer, flits to a spot beneath the ferns. Red-breasted nuthatches explore a warm pine trunk. Purple finches sing cool, frosty songs at dawn, and at dusk the white-throated sparrows pipe in the raspberry tangles.

In June the trail is alive with bird song and colorful with flowers—with a thousand-thousand tiny pink bells of the twinflower, with the four-petaled mosaic of bunchberry blossoms, with the lemon-green lilies of Clintonia, and the secret perfection of tiny flowers on the mats of snowberry upon decaying old logs. In August the raspberry tangles in sunny places are bending with rich, fragrant fruit upon which the bears come at dusk to dine. In August the trail has the waxen white bells of wintergreen flowers and a startling,

A red squirrel stretches full length on a sunny branch to take a brief nap at midday.

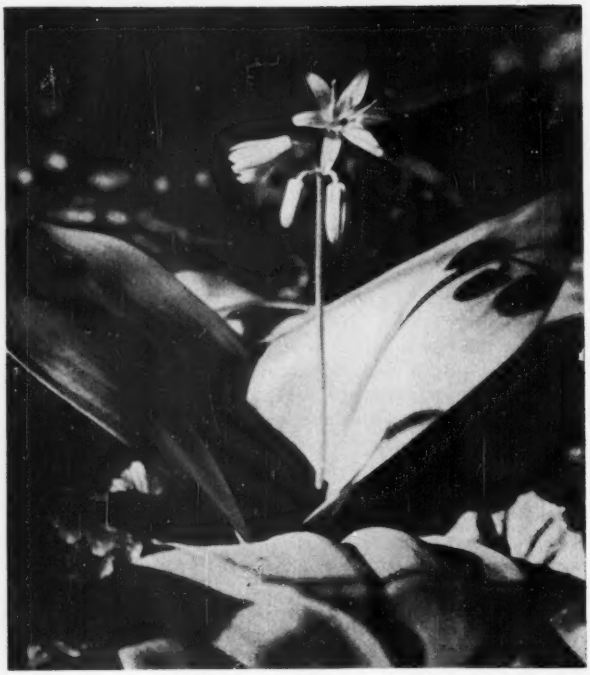
Remains of the burned forest of an earlier day still stand among the new growth of trees.

ice-white clump of Indian pipes near the old mossy stump. The pink bells of twinflower are gone, although now and then one may remain until a passing deer crops it off. The bunchberry blossoms are replaced with rosettes of bright scarlet fruits. The clintonias bear Prussian-blue berries. The snowberry flowers are replaced with delectable white berries flavored with wintergreen and cream.

The trail passes beneath the tree where a great horned owl sits to digest its meals. Under the tree in winter there are regurgitated pellets composed of white bones and white fur, probably those of snowshoe hares, but in summer the pellets are all brown, with white bones scattered through them.

The trail dips abruptly past a corner of cedar bog where the pattern of sphagnum and white oxalis leaves glistens in the sunshine. This is the place where the parula warbler sings so insistently in summer, and where the Canada jays drift along to join the hiker as he travels into the snowy forest.

The trail climbs, then comes out into the sunnier expanse of the Seven Mile Trail. A pileated woodpecker yammers hysterically, and flies with a splendid flashing of black and white wings to a tall dead hem-



Along the trail are the lemon-green lillies of Clintonia.

lock, which the great bird attacks with magnificent strength of beak and neck. Silhouetted against the sky, the biggest woodpecker of the north is still the emblem of its remaining wildness. This, like the fluting of the hermit thrush and the yodeling of the loon, the footprints of the deer, and the bear coming like a silent shadow down the ridge at dusk, is a symbol of the whole unconquered northern wilderness. For, in spite of many enemies, that wilderness still lives in spots like these.

And a quarter of a mile further north along the trail stands the Twenty Dollar Pine.

Innumerable big stumps are around it, but the pine stands tall and noble and alive. It is a white pine, which, during the time of the old forest when shade was dense, lost through natural pruning its lower branches. They are all high now, forty feet or so from the ground. And each year the tree produces blossoms and new cones. The cones open, and the winged seeds come forth and flutter, twirling, to the ground. Many of them lie in moist sand and moss, take root, and grow. Around the Twenty Dollar Pine today there are many seedlings that one day will help to repopulate with white pines an area that once was dominated by them.

This is the secret of the Twenty Dollar Pine; this was why Sidney Fell wanted that big seed tree beside the trail. He knew that as soon as he could—in a matter of weeks—he would purchase that tract of woods, and although the loggers were in there now, he felt there would be enough small stuff to grow into a large forest some day. But they were cleaning out the white pines, and he had to have a seed tree. If the loggers took it with all the rest, the pine would be cut off at the snow line, would be stripped of bark and branches, and perhaps thirty percent of the great tree eventually would go to the sawmill and be made into lumber. And that would have been the end of the pine. Left standing, the tree continues to reseed the woods from which most of the pines were taken. For twenty dollars, then, it stood. It is the living nucleus of the wild forest, once more grown up around it.

It's 'Aard Vark and No Play!

By EVERETT SCROGIN

To spot the Aardvark's habitat
(I mean by that, the place he's at,
His home address, his lair, his sanctuary),
You'll always find our subject, son,
In Africa, and on page 1
Of Webster's illustrated dictionary.

It may, or may not, interest us
That he's an *Orycteropus*
And placed in Order *Tubulidentata;*
That latter term is mentioned here
Because it means his teeth are queer,
According to our zoologic data.

The Aardvark's beauty isn't much,
His skin you wouldn't love to touch
Because it's thatched with coarse, disheveled bristles;
If you adopt one for a pet
The fun you'll get will not offset
The scratches from his outer membrane thistles.

Right now I think it's time to pause
And call attention to his claws
Because his paws and claws are so unequal;
Just shake his hands and you will find
Four claws in front — and five behind!
Now why did Nature make a beast so freakual?

Spying on the Gambel Quail

By C. M. PALMER, JR.

Illustrated by the Author

Most of the quail broods that came to drink numbered at least six young, but there was one pair of parents that ushered in a lone chick, a spoiled brat.

"THESE quail are sure funny, Dad," wrote the boy, "they act just like people."

This observation was contained in his first note home after taking off on a summer job as field technician for the Arizona Game Commission. We were pleased to see his powers of observation developing along with a saving sense of humor. And, too, for the first time there seemed to be a real interest in wildlife.

This, his first job in the wildlife field, was one that really demanded a sincere and sustained interest to carry him through. Fresh out of the critter comforts of the Sigma Chi House at the University of Arizona, where he is majoring in range ecology, he had packed his bed sack and camp outfit into the hottest of dry country — or vice-versa — the cholla meadows, so-called, just south of Florence. The water in his canteens and water bags was ear-marked for drinking and cooking. And that was all! Gone but not forgotten were the hot and cold showers at the "Chink House," with luscious soapy lather dripping from stem to stern. No shaves! Just heat and sweat, dirt, grease and more of it. "Boy, am I dirty. I dunno whether I like this job or not."

He liked it well enough, however, to stick it through the summer and to finish it up. In mid-season we finagled a few days with him to see how things shaped up. Kidded by all his friends as the "quail counter," he was seriously studying the use by wildlife in general and the Gambel quail in particular, of a series of artificial water holes, strategically placed over this desert area by the game commission. He moved daily from one "catchment" to another, locating them by map but not without difficulty in this rough terrain.

These "catchments" were designed along the lines of the "quail guzzlers" that have apparently proven so satisfactory in California. Briefly, they consist of a large fan-shaped concrete apron that funnels rain water, when available, into a covered concrete tank sunk into the ground at its lower end. The tank holds about twelve hundred gallons of water, which is available to birds and small mammals by means of a ramp down to the water level at the far end. This is enclosed in a fenced area about thirty-five yards square and where grass and ground cover is protected from grazing. It is marked as a wildlife refuge. It would seem, with all the public land available, that this area could well be much larger.

Our burlap blinds, usually in a palo verde, bulged with the two of us, our folding chairs, field glasses, cameras, note books, and such. There was little elbow room. The burlap sun-shade over our Stetsons was a big help in sweating out nine hours of that burning sun daily.

We made out, however, and when business was good, the hours were short. During the real rush it was no mean chore to keep abreast of developments, and to keep our records straight. With a half-dozen or more coveys or broods of quail of all ages on the stage at one time, the concentration required to determine, species, age, sex, number of chicks, which ones drank, when, where, how and why, allowed no time to speculate on the heat and discomfort.

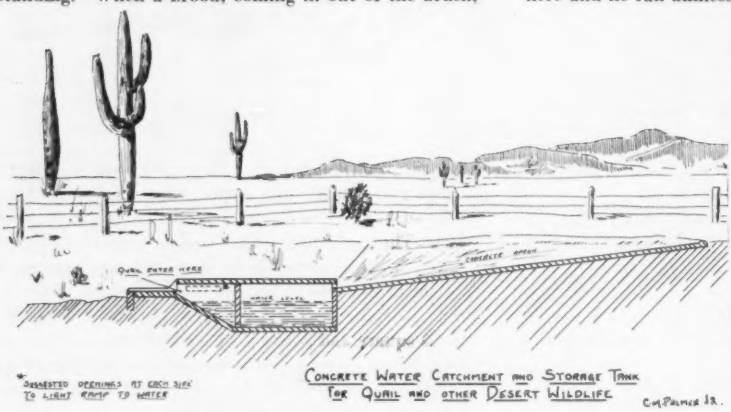
Harris' ground squirrels were the speediest visitors. This one takes a quick look about.

It was a wonderful little drama going on out there. The scene was much the same for all the acts, but the actors were changing constantly and each one played his own individual part in his own inimitable way. Over all was the tenseness of constant watching for potential tragedy, but there was much of comedy all through the play. In our private box we chuckled soundlessly during long hours of watching.

The Gambel quail was the principal actor and, as Bud said, they really did "act just like people," in many ways. In their dealings with each other, and the several other

species gathering for the precious water on these hot days, they acted and reacted much as might so many humans under similar circumstances. However, in the matter of manners and consideration for others, we fear that *Lophortyx gambeli* has a definite and pronounced edge on *Homo sapiens*.

Never once during our periods of watching did we see any sign of controversy over protocol, seniority, priority or any other real or imagined preferential standing. When a brood, coming in out of the brush, found another at the water, they politely awaited their turn. During the rush period of late afternoon that politeness and consideration seemed almost a bottleneck with so many birds to be watered. Yet, one brood at a time, they bellied up to the bar, drank their fill and promptly made room for the next.



CONCRETE WATER CATCHMENT AND STORAGE TANK FOR QUAIL AND OTHER DESERT WILDLIFE

C.M. Palmer '32.

Other species, such as the mourning dove, the white-wing, road runner, Gila woodpecker and even the little cactus wren, would unhesitatingly barge in on a covey drinking. But invariably they would immediately feel the wrath of the head of the family as the cock ran them off.

There was, inevitably, some intramural friction in the family. The invariable cause of this was the eternal feminine, object of the search of the still bachelor cocks who refused to admit defeat. But the head men of these little families soon cured these obstreperous popinjays of their crazy notions. The mated pairs with their broods were just so many seriously busy parents watching out for the well-being and manners of their youngsters. And it was noted that they were much better at it than many of their human counterparts.

Those bachelor cocks were something to consider. They were the jitteriest critters imaginable. For example, one blew in at 8:10 one morning, and, for more than an hour and a half, he ran himself ragged, making entrances and fast exits and clowning all over the place. He was not trying to be funny. He was up against a real problem, but he *was* funny. Every head-of-the-house who arrived with his grande dame and family ran him into the brush, and *very definitely*. Between times, all kinds of imaginings kept him constantly on the prod. He was never still for a moment. He ran here and he ran aimlessly there, a few steps in each of several directions. Then he would jump and run off into the brush again for no apparent reason. Promptly he would be back for an encore.

It was obvious that, along with his other problems, and perhaps because of them, he was thirsty. Many times he approached the ramp with fear and much trembling, to peer down into the dark depths, jump up on the tank cover, drop back down again, run off a few feet, return, and then, panic-stricken, race out of the picture completely. Never did he muster up the necessary courage to go down into that "black hole of Calcutta" and buy himself a drink. One belligerent "family man," resenting Beau Brummel's "goggle eyes" at his lovely spouse, ran him completely around the area three times and then out.

Not all of the bachelor cocks kept up the fight eternally, however. Some, it seemed, had given up the fruitless search for a mate and attached themselves with resignation to the families of their more successful brethren. Many of the broods came along with such an "Uncle Harry" tagging along in the rear, just as busy and seemingly just as important as either parent. He tailed the brood and "ran herd" on them with all the bluster and authority of a real uncle as, indeed, he might well have been. He picked at the laggards, chased the wanderers back into the fold with enthusiasm. This situation seemed to be accepted by the parents. Perhaps father could see that "Uncle Harry" no longer had that gleam in his eye. But, occasionally, to keep uncle in his place, and to show who was really running the show, Pop would dive at him with bared bill and bristling feathers and run him off. Poor old "unk" was philosophical about it, and came right back to carry on with his chores. Certain it seemed, how-

Among the visitors to the water catchment was the cactus wren.

ever, that, had danger threatened that little family, "Uncle Harry" would have died valiantly in its defense, along with Pop and Mom.

Usually the mother bird led the way, with Pop supervising things, watching all four points of the compass, the skies overhead and the ground underfoot. Mother led the chicks down the ramp to the water, while dad mounted guard up above. Rarely did he stop to drink, even when the family had had their fill. He would stick to his knitting and maneuver his flock back into the relative safety of the brush, taking his water requirements where he might find them.

The birds were always on the alert watching for trouble. But during our brief vigil we saw no positive evidence of predation at these water holes. The birds were under constant tension just the same, however, and frequently flushed right out of the picture for no reason we could ascertain. Once they came right through our palo verde, barely skimming over the burlap sunshade. Ever have a covey of quail flush right into your face? It is an experience.

A raven flew in and dropped on the fence once and two or three coveys left in a flash of feathers. When a coyote appeared they faded into oblivion. They also gave up the premises to a crotchety old badger.

Road runners were visitors.

Much has been made of the unfriendliness of the road runner to young quail. Several times while broods of young quail were at the water, or awaiting their turn lying in the meager shade of the chollas, the furtive chapparal cock made his entry, slipped to the ramp for a drink, and as quietly eased out of the picture. Not once did he give more than a passing glance at the toothsome young chicks. And, even more significant, the quail paid him no more mind than they would had he been another quail.

Badgers came to drink, also.

The normally harmless little sparrow hawk, on the other hand, roused every adult quail in sight to battle, when suddenly he dove in and made a mischievous pass at them. He fooled around there for half an hour, sitting on the fence and watching those young chicks with obvious relish. Every few minutes he made a definite pass at them, but the battling Gambels met him head on every time, male and female, a mass of bristling fury, side by side, in front of their precious babes.

That boy, we were convinced, would have had him a chick had he been able to collect a specimen. They will do it occasionally, as we well know, but they do not prey on birds often enough to become a menace to quail populations. On the contrary, their very activities in controlling the insect horde may well rate them an occasional bird tidbit.

The broods we counted averaged about six chicks, with top honors going to one pair with a family of nine. This was considerably below the brood of *twenty* scaled quail chicks we watched every day for over a week later in the season at a dirt tank in Cochise County. Incidentally, we saw no scaled quail in the cholla meadows, while at this particular tank in Cochise County we never once saw a Gambel quail, although there are lots of them in that county.

Unquestionably, the proudest and busiest parents were those that ushered in their one downy chick to the water hole. He is certain to grow up a spoiled brat.

The older birds, which had become used to drinking at this unusual water hole, had relatively little difficulty coaxing their chicks to follow suit. But many of the older birds had never gotten used to that water hole in the ground. They seemed unable to bring themselves to go down that dark ramp for the water they wanted. The badger, the Harris and roundtail ground squirrels, and the cottontail, the only small animals we observed actually using these facilities, hesitated not at all. But they are used to holes in the ground. The badger matter-of-factly moved in, got himself a drink, backed out and ambled off to his diggings. The Harris ground squirrel was the speed king. He raced in and out, and that was about that. "Harris g.s. tears in for a 'quickie'," our notes indicate, "then off he goes. Busy, these babies!"

The cottontail took his own good time about things. He never seemed in a hurry. We clocked one of them

on the ramp for four and a half minutes. All we could see of him was the upper rear end, but we assumed he was not drinking all of this time. He had to come up for air occasionally. Although they were often in the immediate vicinity of the "catchment" nary a jackrabbit came near the water. Bud saw several bobcats during the summer drinking at these "catchments," but we did not happen to see any while we were on hand.

The quail are not used to holes in the ground, and many fear them too much, apparently, to venture down for the water. They try but cannot overcome the fear in them and go off without drinking rather than take a chance. We observed this often with as many birds.

A good bit of this reluctance might easily be overcome, it seemed to us, by making an opening at each side of the ramp section of the tank, letting in light and air and removing that dark and closed-in atmosphere. This opening need be no more than a couple of inches high by six to twelve inches wide, just above the ground level. The sketch accompanying will show the approximate position. This opening would affect evaporation little, if any; it would cost nothing, and it would, we feel sure, induce more birds to take advantage of the new plumbing system.

The idea of providing water holes for desert birds is interesting. California tried it and seems satisfied with results achieved. The birds have demonstrated that they will use the water when it is so available. But they have done well adapting themselves to their desert environment for, lo, these many moons. The dry seed-eating mourning dove seems to need free water to satisfy his physiological requirements, but the more omnivorous quail is not so dependent on it. From succulent fruits, vegetation and insects he can derive all he needs, and he can get along without free water for long intervals. This, apparently, is even more true of the scaled quail than the Gambel. In far greater numbers than they can boast today, quail have existed for centuries in our desert country.

Since the coming of the civilized white man, however, things have happened to his desert home. Abuse and misuse of the range have not improved the lot of our desert quail and his wild neighbors. The traditional management of natural resources by man, superior *Homo SAPiens*, demonstrated from the beginning of history throughout the world, has not made it easier for Mr. Gambel and his wife and children. Perhaps our more recent efforts of really enlightened range management will be in time to realize some restoration of what we have wantonly destroyed. In the meantime, such stop-gap means of water utilization, for quail and other purposes, may be of material value in helping the quail to hold their own, and, perhaps, even to help them rebuild their scant populations.

On the Air

By RUTH SEYMOUR VESELY

The linnet on our maple tree
Warbles his little heart out
And I'd rather hear him hit high "C"
Than Gladys Swarthout.
She's wonderful, but I pretend
The linnet sings to *me*, his friend.

Ambitious Trillium

By B. F. SCHULTZ

Photographs by the Author

Most trilliums are satisfied with three petals, but now and then a wild trillium will outdo itself. Bright-eyed Bobby Karas of Escanaba, Michigan, was wandering in the woods of Michigan's Upper Peninsula on Memorial Day. He spotted a truly ambitious specimen of the white trillium, or large-flowered wake robin. The plant is known to science as *Trillium grandiflorum*.

Being careful not to injure the plant itself, Bobby harvested the bloom, which was found to have a remarkable total of thirty petals, and which made it look almost rose-like. Bobby marked the spot where he made this find so that next spring he could come back and see whether there might be more of these many-petaled trilliums.

Odd Mollusk Egg Cases

By GRACE SHULTS DAVIS

THE first time I saw a moon snail it was perched on what seemed to be the round top of a rock protruding from a section of mud flat of chocolate pudding consistency. I waded out to retrieve the large snail as a prize.

Certain surprising things happened in rapid succession. First, the supposed rock clung to and was lifted up with the snail, and was found to be rubbery and soft. Then a spray of sea water shot out as if from the end of a hose against which someone had pressed a thumb. Next, the snail suddenly swallowed the rubbery "rock," and although it had appeared to be several times larger than the shell, the huge foot disappeared completely, while a little golden door of satiny surface sealed up the opening.

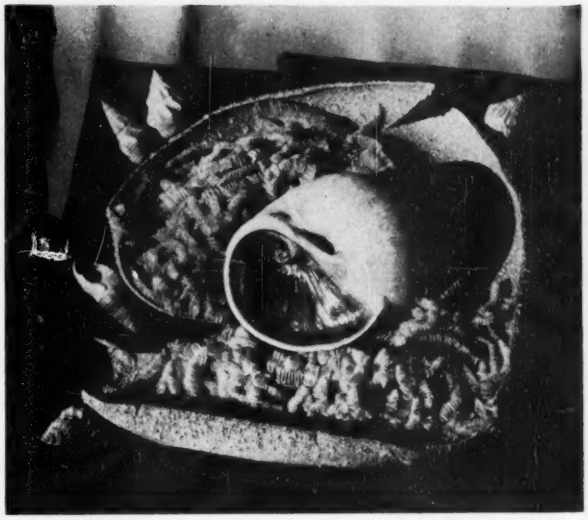
Even after having watched that remarkable performance repeated on numerous occasions, it is still hard to believe that a thick "foot" of sometimes ten inches in diameter can be contained within a shell scarcely more than two inches in width.

The moon snail's large "foot," as this organ is called in nomenclature descriptive of mollusks, is the creature's hunting weapon and food-gathering implement. All of the Naticidae Family, to which the moon snails belong, are carnivorous, feeding principally upon other mollusks. They smother their prey by sitting on them with this large foot. The moon snails prefer clams, devouring them by sending their raspy tongue between the halves of the clam shells when the muscles holding the valves have relaxed upon the victim's death.

Commercial oyster fishermen claim that the moon snails damage oyster beds while plundering among them in search of clams. So the oyster men destroy the moon snails, even though it is known that they do not actually feed upon oysters.

As a matter of fact, the chief destroyer of oysters is the sharply-coned murex, *Urosalpinx cinereus*, called the "oyster drill" — and killed on sight by oyster fishermen.

The "drill" by which the small gastropod, less than an inch in length, can dispatch an oyster several times its size and encased in a heavy shell, is not the pointed, drill-shaped cone as the name applied to the gastropod might falsely indicate, but the toothy tongue, or radula. If the thought of a bit of muscle drilling through a flinty shell seems impossible, we can recall that the drill is lubricated by water carrying cutting sand grains.



Egg collar of the Lewis moon snail, *Polinices lewisii*, filled with egg case strings of the "oyster drill" mollusk, whose empty, sharply spiralled shells surround the large egg collar. In the center is a Lewis moon snail showing the operculum, or door, closed over the aperture. About one-half life size.

Through the smooth circular hole thus drilled, the small gastropod devours the big oyster. More than an epicurean, its sole diet is raw oysters — in the whole shell.

Other than for its oyster-eating proclivities, this particular murex has found itself a subject for the current discussion because of the elaborate egg cases left by it. These are of thin, transparent, parchment-like material, and they are attached in strings, usually to rocks or pilings.

Upon finding a mass of these egg strings deposited in a discarded egg collar of the Lewis moon snail, it occurred to the author to photograph the two mollusks together. In the accompanying picture can be seen the somewhat dilapidated egg collar containing strings of "oyster drill" egg cases, while several shells of "oyster drills" lie on the tray surrounding the collar. In the center is a large Lewis moon snail with its operculum covering the opening.

The "egg collar" of the moon snails is formed over the extended foot, acquiring its shape. It is manufactured in some ingenious method known only to a moon snail by combining a gelatinous secretion with sand. It has the texture of rubber, and looks like something that might have been used in a plumbing fitting.

These sand-encrusted objects may be found floating in the edges of bay waters where they have washed from mud flats inhabited by the moon snails. We believe that the "collar" is worn over the foot until the eggs have hatched. This is one of the rare instances of anything like parental care on the part of a mollusk.

The Natural History of the Silver Dollar

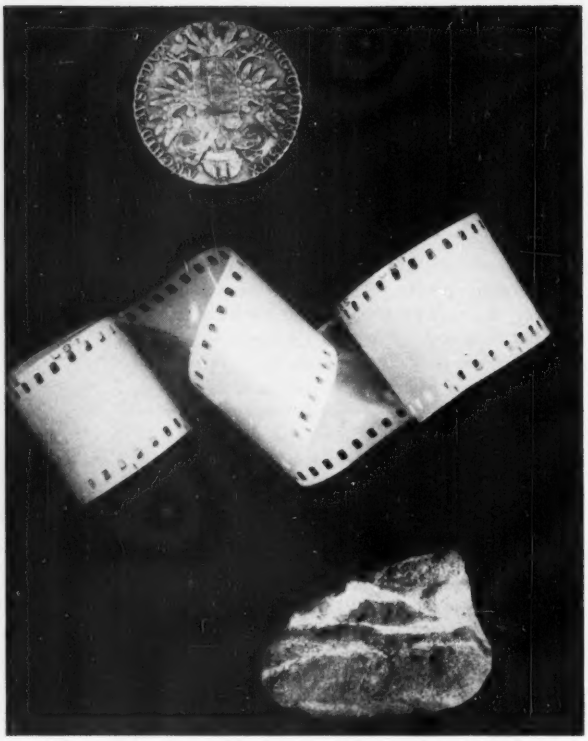
By HOBART E. STOCKING

Photographs by Lamberson

IN THESE times, when a silver dollar appears such a small item, it is well to remind those fortunate enough to have contact, however fleeting, with this the metal that is its base, that it has a long and honorable history. It is even a blood-relative of that superplanetary commodity, uranium. Through the natural history of silver is woven the names of a German Count, an Austrian Empress, a new nation and an ex-President.

In 1516, in an isolated and unnamed valley in Bohemia (now a part of Czechoslovakia) someone found a deposit of silver. Just who made the original discovery is not recorded, but it is known that one Count Joaquim Schlik was an early operator of the mine, and his name, given to the locality, still reverberates through international politics.

Even with the primitive mining methods of that day Joaquimthal — Joaquim's Valley — yielded nearly a ton of silver a year during the first two decades of operations. It produced other ores, too, but these had no use in the commerce of that time, and the heavy black material associated with silver in the network of veins traversing solid rock was discarded as worthless.



The Maria Theresa dollar bears, abbreviated, the inscription: "Archduchess of Austria, Duchess of Burgundy. Countess of Tyrol. 1780." However, despite the date, the coin could have been minted within the past five years, since all such coins minted bear the 1780 date. Below is the ore of uranium, the mineral carnotite in sandstone, the lighter veins being fissures of the pure, very bright-yellow carnotite. Specimen from Utah.

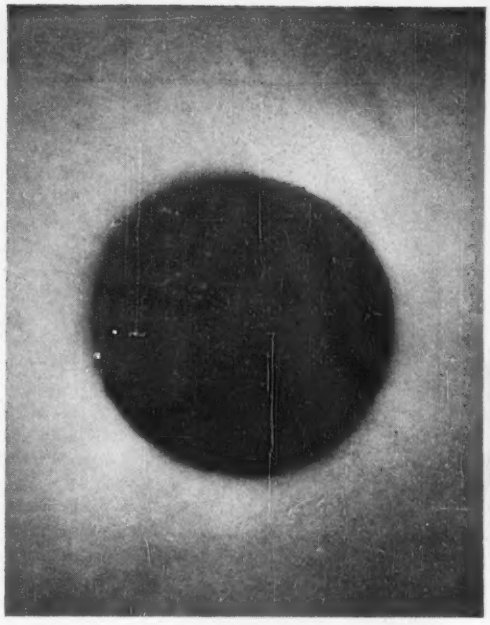
In those days local potentates were usually their own minters and a good many turned this privilege to profit. To the silver and gold for coins they added as much of cheaper base metals — lead, zinc or copper — as possible without imparting a dull ring to the metal. From a rich silver mine Count Joaquim Schlik had a superabundance of silver and it was cheaper to strike coins of the pure metal than to import lead for adulteration. The Count's coins were truly good goods. They bore the profile of St. Joaquim, the Count's patron saint, and the name "Joaquimthaler" after the locality of origin. Of solid silver, they were so recognized and were acceptable everywhere.

The Count may have been an enlightened ruler of his time. At any rate there was a physician in the mining camp who became so familiar with the mine, and the methods by which it was operated, that he eventually wrote a treatise, in Latin, which recorded all that was then known of mining geology and metallurgy. President Hoover and his wife, Lou Henry Hoover, translated Georg Agricola's "*De Re Metallica*" from Latin to English, and the volume, oldest of all mining textbooks, has long been a curiosity among geologists.

Georg Agricola wrote under a pseudonym of a sort. His nationality was German and his name actually Bauer — German for farmer — to which he gave the Latin form, Agricola, since he wrote in that language. In his medical practice Agricola (Bauer) must have treated miners as best he could for ailments induced by breathing radioactive material, for in those days mine ventilation was a haphazard operation and the heavy black gangue associated with silver in the veins at Joaquimthal was pitchblende, the ore of uranium.

Count Joaquim's joaquimthalers garnered an enviable reputation of unimpeachable quality wherever they circulated, for they were solid silver. As they became better known the name was shortened to "thaler," it being understood that they were from Joaquim's. The name was, then and now, pronounced exactly as if it was dollar spelled with a "t," and in time it was written as it was pronounced — dollar.

This is a silhouette photograph of a Maria Theresa dollar taken by carnotite. The dollar was placed on a wrapped negative and the uranium ore placed on the dollar. Radioactive emanations from the ore readily penetrated the wrapping of the negative, but were retarted, relatively, by the thicker metal coin.



Although the Count had long since disappeared from the scene and the silver bonanza at Joaquimthal became exhausted, the reputation of joaquimthalers, by that time familiarly known as dollars, endured untarnished to the time of Maria Theresa, Archduchess of Austria, Queen of Hungary and Bohemia. To commemorate her death, dollars bearing her profile and rimmed with her titles were struck. They were bona-fide silver, also, and Maria Theresa dollars became legal tender in eastern Mediterranean provinces. They bore the date 1780, and practically every year since the same identical dollar bearing the commemorative date have been minted in one or another European capital for circulation in the Levant. It must be a confusing circumstance for coin collectors, since 1952 Maria Theresa dollars, minted in London, appear identical to the 1780 Austrian issue.

For centuries the pitchblende at Joaquimthal was of concern only to those interested in natural science, but among them, at least, it had a wider circulation than did the dollars minted from the silver associated with it. One sample of pitchblende from Joaquimthal lay on a well-wrapped photographic negative in the Paris laboratory of Henri Becquerel, a French physicist. When the unexposed negative was developed it was found to have been "exposed" by some sort of rays emanating from the fragment of Joaquimthal pitchblende. On this clue, and at Becquerel's suggestion, Madame Sladowska Curie, an early refugee from Polish Russia, began experiments on a few tons of pitchblende from Joaquimthal. Success was tediously achieved but to Madame Curie came recognition for her discovery of "polonium" and "radium" — radioactive elements present in pitchblende.

It was a few years after the death of Maria Theresa of Austria that the Continental Congress of the new United States adopted "dollar" for the name of its monetary unit. It may be that Continental dollars were not the soundest currency of that day, but by the time another Congress had spent a billion or so of them in establishing uranium — its cinderella cousin — in a position of incredible importance, the dollar had gained a reputation as remarkable as a solid-silver joaquimthaler.

Mysteries of Nature

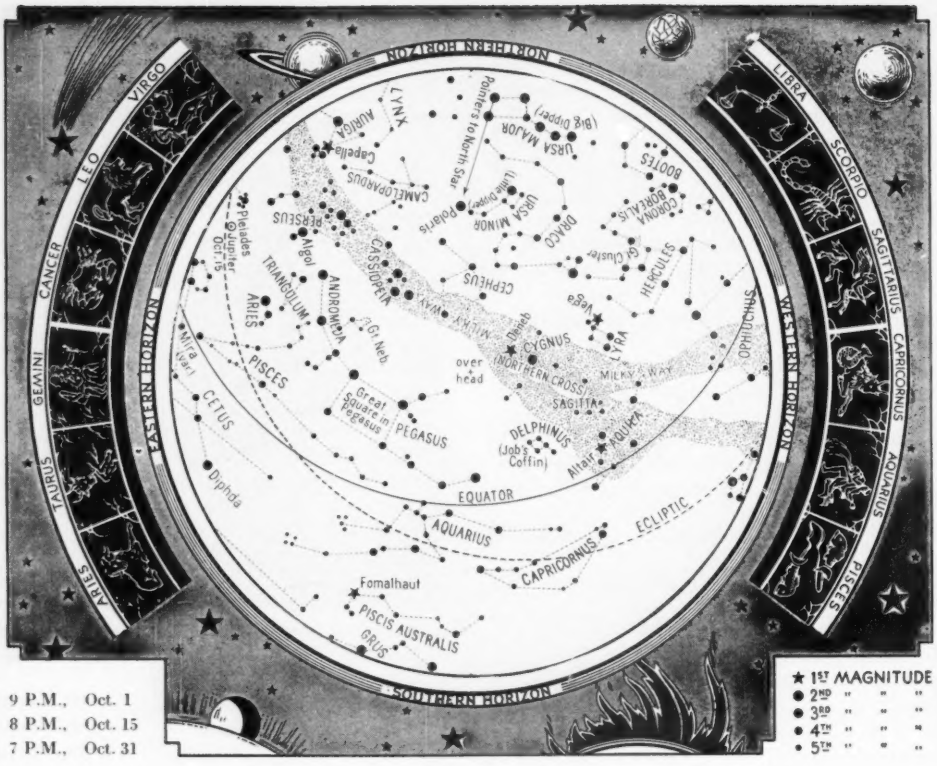
By MARGARET WHITTEMORE

LITERATURE abounds in references to Nature and its vast creation. Here are a few quotations. Can you match each with its author? See page 442 for the answers.

1. God made all the creatures and gave them our love and our fear,
   To give sign, we and they are His children, one family here.
2. Behold the heaven and the earth and all the elements; for of these are all things created.
3. All are but parts of one stupendous whole,
   Whose body Nature is, and God the soul.
4. In nature's infinite book of secrecy
   A little I can read.
5. Gie me ae spark o' Nature's fire,
   That's a' the learning I desire.
6. In the vaunted works of Art,
   The master-stroke is Nature's part.
7. I go to books and to nature as a bee goes to the flower, for a nectar that I can make into my own honey.
8. Go forth, under the open sky, and list
   To Nature's teachings.
9. After you have exhausted what there is in business, politics, conviviality, and so on—have found that none of these finally satisfy, or permanetly wear—what remains? Nature remains.
10. There is a pleasure in the pathless woods,
    There is a rapture on the lonely shore,
    There is society, where none intrudes,
    By the deep sea, and music in its roar:
    I love not man the less, but Nature more.

List of authors.

a. Walt Whitman; b. William Shakespeare; c. Thomas a Kempis; d. Robert Browning; e. Lord Byron; f. Robert Burns; g. John Burroughs; h. Alexander Pope; i. Ralph Waldo Emerson; j. William Cullen Bryant.



To use this map hold it before you in a vertical position and turn it until the direction of the compass that you wish to face is at the bottom. Then, below the center of the map, which is the point overhead, will be seen the constellations visible in that part of the heavens. It will not be necessary to turn the map if the direction faced is south.

The Skies from Our Equator and Poles

By ISABEL M. LEWIS

ON THE earth's equator, and there only, is it possible for one to see every region on the celestial sphere, from north pole to south pole, appear above one's horizon within the period of the daily rotation of the earth upon its axis. There, also, in the period of the yearly revolution of the earth around the sun, *every object in the heavens* will appear in season in the night sky.

At the equator the diurnal paths of all objects in the heavens not on the celestial equator are parallel to it and perpendicular to the horizon. The celestial equator itself passes directly overhead and through the east and west points of the horizon. Except for the effect of refraction, which causes an object to be visible for a short period before it has risen or after it has set, all objects are above and below the horizon daily for equal periods of 12 hours. The south pole of the heavens lies at the south point of the horizon, and the north pole at the north point of the horizon. Neither of these two points have any diurnal motion. The diurnal motions of all other objects in the heavens are most rapid at the equator, where the diurnal paths are longest, and slowest near the poles, where the diurnal paths are shortest. The 24-hour period of rotation around the poles is uniform so the diurnal motion must be most rapid where the diurnal path is longest, on the celestial equator.

Stellar objects most unfavorably placed for observation at the equator are those in far southern and northern circumpolar regions as they never can appear far above the horizon, even when crossing the meridian. As it happens, however, there are no bright stars near the south pole of the heavens, and, with the exception of Polaris, The North Star, which is of second magni-

tude and on the northern horizon, no other star as bright lies near the northern horizon. The heavens viewed from the earth's equator are, indeed, unsurpassed in splendor anywhere, since in the course of the year all of the finest objects of both northern and southern hemispheres, all of the most brilliant stars, the Milky Way through its entire circuit of heavens, and all of the planets come above the horizon and in excellent position for observation.

At the time of the equinoxes, when the sun is crossing the celestial equator, it passes directly overhead at the earth's equator, rises due east and sets due west. As the ecliptic, the yearly path of the sun, is inclined about 23½ degrees to the celestial equator, the sun, at our summer solstice, passes 23½ degrees north of the zenith for the observer on the equator, rises 23½ degrees north of east and sets equally far north of west. At our winter solstice it crosses the meridian at the same angular distance south of the zenith and rises and sets equally far south of east and west, respectively.

The planets and the moon, never far from the ecliptic, also are seen always at these same high altitudes at the earth's equator. This makes for the finest conditions for observations of these bodies. As the ecliptic rises more sharply from the horizon at the equator than anywhere else on the earth surface, twilight is shortest there and stars and planets appear with startling suddenness, as it seems to those who are accustomed to the lengthy twilights of mid-latitudes. There Mercury is seen to the best advantage and the zodiacal light, so difficult to see in mid-latitudes, is there a magnificent, luminous band often seen arching across the heavens along the ecliptic from western to eastern horizon.

To a less degree many of these advantages of a position on the earth's equator are shared by all observers of the heavens who are located in equatorial regions, especially for observations of the planets.

As one travels northward or southward away from the equator the celestial equator becomes more and more inclined from its perpendicular position, the angle that it makes with the horizon being always 90 degrees minus the observer's latitude. The diurnal paths of the stars, always parallel to the celestial equator, are now inclined obliquely to the horizon.

As one increases his distance from the equator northward (similar phenomena occur if one travels southward from the equator) one observes that there is now a region around the north pole within which the stars never set, and there is also a region of equal extent around the invisible south pole within which, for him, the stars never rise. These regions increase in size the farther one gets away from the equator. The distance to which they extend from the poles is always equal to the latitude of the observer. If one is in latitude 40 degrees north all celestial objects within 40 degrees of the north pole never pass below the horizon and objects within 40 degrees of the south pole of the heavens never appear above his horizon. When one reaches the north pole the celestial equator, which has been gradually decreasing its elevation above the southern horizon, now lies entirely in the horizon. The north pole, which has an elevation above the northern horizon always equal to the latitude of the observer, is now directly overhead. What strange celestial phenomena may be seen as compared to those which exist for the observer at the equator! Only that part of the heavens north of the celestial equator is above the horizon. Instead of rising and setting every 12 hours, the stars above the horizon are all circumpolar and never pass below it. They complete one circuit of the heavens parallel to the horizon and around the pole in the period that the earth turns once on its axis. The sun, as well as moon and planets, are visible only when north of the equator. For six months at the pole one has perpetual daylight, followed by six months of perpetual darkness. As a result of refraction the period of daylight is lengthened somewhat at the expense of the night, and the twilight lasts continuously for a number of days as the sun, *before* rising in the spring and *after* setting in the fall, is for long periods not far below the horizon. The worst "seeing" of any place on earth for an observer of the heavens is found at the poles.

The highest elevation of the sun above the southern horizon at the north pole, which is only about 23½ degrees, occurs at the summer solstice. The sun has been following a slow spiral course upward, only a slight change in elevation above the horizon appearing in a day's time, since it first was seen on the horizon shortly preceding the date of the vernal equinox. After the summer solstice it slowly retraces its spiral way downward to the horizon, where it disappears in a glare of twilight after the date of the autumnal equinox.

In the night skies at the north pole the planets are seen at their worst. Mercury is hopelessly invisible, or lost in the twilight, most of the time. When in constellations south of the equator, as Jupiter and Saturn may be for a number of (Continued on page 442)

Voyage of Light

By DANIEL SMYTHE

The swiftest running traveler
Which out of space has been a spur
For all the world of green we see,
Is this flame from eternity.
We do not know the source, the power,
That hurtles countless miles an hour.
Some star-light, incommensurate,
Betrayed on photographic plate,
Has been the cosmic arrow flown
In ether's mammoth gulfs alone.
Or curved by gravitation's pull,
It hits the aimed glass clear and full
And shows us cosmic clouds' events,
The pitted moon's circumference.
Here is what sky has widely hurled
Upon the pinpoint of a world —
Ever so tireless in their flight,
Swift runners of the stellar night.

The School Page

By E. LAURENCE PALMER

Professor of Nature and Science Education, Cornell University, and Director of Nature Education, The American Nature Association

GOOSE EGGS

IN THE announcement of a major midwestern university's course in "Science in the Elementary School" we read that "no science background is assumed and no attempt is made to cover content." Yet the course deals with "experiences, techniques and organization of science content." It seems to the writer that Shakespeare suggested a superior title for such a course in his play "Much Ado About Nothing." How can one organize something one does not have? What can be expected of students who go through such a course and come out with the idea that they are so qualified in the field of science, even for the elementary school, that they have three hours of advanced university undergraduate credit in the subject? It is embarrassing for me to have to quote from the Scriptures here to the effect that "though I speak with the tongues of men and of angels, and have not charity, I am become as sounding brass, or a tinkling cymbal."

How can one be charitable when teaching, the noblest human profession, is being hoodwinked by this sort of stuff? Is it not sounding brass and tinkling cymbal to teach a course and avoid content? Why boast about the fact that in such courses the mastery of content is not only avoided but apparently glorified? How can one give a university grade for any such course except by writing down a row of goose eggs as long as those commonly used to represent the last nine figures in the national debt?

Is it not possible that, at last, the political philosophy of paying industrialists for not producing things, farmers for not cultivating their land, human beings for not working, children for doing only what they may want to do, is crashing the field of education? Now we give college credit for avoiding mastery of content, or we entice students into our classes by saying that they need know nothing, and we will avoid making them work to learn something. True there has been much padding in this field but it has hardly been so blatant as the quotation that started this article. I have a paper handed in by a California school boy who must have experienced this kind of education. He wrote a note to a friend saying: "Dear John: I didn't learn nothing. Don't you want to come over and not learn nothing, too?"

Not long ago I had occasion to advise a university undergraduate that, in my judgment, he was making life more difficult for himself because of his unwillingness to get down to work to the best of his ability. I expressed the thought that he might be making life hard for himself by his habits, his unwillingness to master content in the fields in which he was working. I am still gasping over his reply, which was to the effect that he felt my way of working was the hard way, that it would be much easier just to vote the prevailing political philosophy and take away from me for his own benefit the profits of my labors. There may be some simple, direct logic in his idea, but it seems to me wholly lacking in foresight, integrity, pride and constructive citizenship. I'm wondering if he is not a product of the educational philosophy that preaches that one should do only those things that one wants to do. I am not wondering in the slightest as to where adherence to such a philosophy will lead.

Today's daily press reports a true-false unit which appeared in the New York State Regents examination in biology for this spring. The key answer given to those who corrected the papers indicated that it was correct that "in the evolution of vertebrates, reptiles are thought to have appeared before amphibians." Obviously to one with a minimum mastery of the content of organic evolution the statement is false. Many students, who obviously knew more than the examination writer, would have been penalized had not a practical teacher taken the State Education Department to task for the situation that developed. Given time to "cover content" a little the examination makers apparently agreed that a mistake had been made, but what an unfortunate mistake it was.

Within the year I have edited some film strips, only to find that the producers managed to insert some pictures I had not originally authorized because the pictures used were pictorially more effective. The fact that they distorted the content had not occurred to the editors. I myself make altogether too many mistakes, but I fail to see how one can be proud of avoiding contact with content in a course carrying university credit. I contend, again, that for such a course the only appropriate credit would be that row of goose eggs indicating a plain zero.

Not long ago, in an unguarded moment, I agreed to enroll in our local Civil Defense program. I have now completed a course designed to qualify me as a block warden. To give me authority I have an identification card and a "helmet" designed to make me conspicuous. I am not ashamed of being identified with this community effort, although I doubt if I shall ever be called upon to put it into practice. The point is that none of us who took the final examination, after having spent four long evenings, could find much in common between what we had been taught and what we were asked. One man gave up in disgust and with a vociferous protest. I stayed by the ship, but why I do not know. I studied the literature provided me and even got bulletins recommended as supplementary reading. I wish that you might see one of these. One of these expensively prepared units issued by the Federal Government might be considered as suggestions for organizing organizations to organize for civilian defense. I searched in vain through its pages for suggestions as to just what I should do in case we had a bomb attack. There was not a word about it. There was "no attempt . . . to cover content." To me it was nothing more than a collection of "goose eggs" and wholly inadequate for the purpose for which it was designed. Fortunately, an unrecommended State publication came to my attention, and in this I found some relief from the quandary produced by my course in civilian defense. I know, at least, what I am going to do, when, I find myself in a variety of situations more than ordinarily dynamic. What disturbs me most is the fact that the obviously inadequate services of those who provide us with some of these "helps" seem to be in no way a handicap for continued public support of what they are doing.

The rugged individualism that in me dates back to Walter Palmer, who came to American shores in 1629, rebels at the modern tendency to foster dependence. I resent the decreased value of my life insurance estate that I built in my youth so that in my old age I would not be dependent on anyone. I resent the loss of China and Manchuria to the forces of communism. I even resent some of the coddling we have given members of our armed forces as much as I resent inadequate support of those genuinely handicapped by military service. A few days after this article is sent to the publisher I expect to enter a private hospital for an operation that I understood I am entitled to have in a veteran's hospital. My refusal to take advantage of that help has practically lost me the friendship of two persons whom I have long known and admired. Besides, I would have had to swear that I was unable to foot the bill myself. I have friends similarly situated. They tell me that I am a fool not to get mine while the getting is good. I really do not see how any social or biologic organism can survive unless its individual parts keep producing, growing, contributing to the good of the whole. The story of the Rappites who founded New Harmony in Indiana, and of the intellectual communists who succeeded there for a few years early in the last century, should be compulsory reading in our schools today. We could learn much from their experience "if we knew it." I cannot bring myself to support any philosophy that rewards dependence, laziness, or dishonesty. I could not teach a course in science that assumes on the part of the learner no background of content and makes no attempt to cover content. Where are we going in this whole thing, anyway? When are we going to stop adding goose eggs to our national debt? As teachers, how are we going to satisfy the debt we owe our

pupils by avoiding mastery of content ourselves?

I must admit that, in legend at least, there are goose eggs that were made of solid gold. The owner of that famous goose went off the gold standard when he killed the goose that laid the golden eggs. I rather think that most of us who heard that story when we were youngsters never forgave the fellow who was foolish enough to kill such a wonderful bird. We like to think what we would have done had we been fortunate enough to own such a gold mine. I like to think that there is something in the suggestion that the American version of "Kill not the goose that lays the golden eggs" is "Every man has a goose that lays golden eggs, if he knew it." I believe that that is more or less true.

It is foolish for any of us to feel that the day of opportunity has passed. It is ridiculous to assume that a society composed solely of parasites can survive. It is equally ridiculous to assume that there is more fun in destroying than in building, avoiding work than working, killing than saving, spending than earning, hurting than helping, stopping than guiding, damning than praising, denying than teaching. But you cannot build, save, earn, help, guide, praise or teach without something fundamentally sound, something basically good, with which to work. You cannot grow and assiduously avoid content. Three hours of college credit, three dollars in cash, three pupils helped to enjoy what life presents them to be of fundamental value must be backed by service, by reality, by content. Golden goose eggs, and goose eggs that mean zero, are available to all of us and particularly to teachers. We have the opportunity to vote, to save, to build, to teach. What more can anyone ask? In what kinds of goose eggs are you interested? "Every American has a goose that lays golden eggs, if he knew it." It is your privilege to help him know it. It is a part of your business to master and to impart content.

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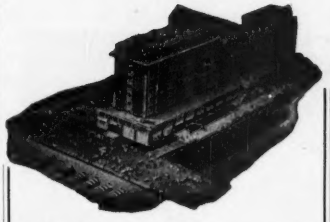
An offer of a $10,000 award for a humane trap that will be acceptable to commercial trappers as a substitute for existing steel-jaw traps is announced by the American Humane Association. Mel L. Morse, executive director of the Association, said, in making the announcement, that the only stipulation about design or construction of the trap is that it must hold a trapped animal without harm, or kill it instantly, and that the trap must be acceptable as a substitute for those now currently used. Patent rights will remain the property of the inventor, and the award is designed to stimulate inventive genius. Full details may be obtained by writing to Lester A. Giles, Jr., Director of Wildlife Department, American Humane Association, 135 Washington Avenue, Albany, New York.



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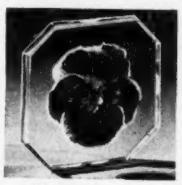

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Camera Trails

By

EDNA HOFFMAN EVANS

AUTUMN is the time for color photography. When the aspen turn to a quaking mass of gold above the 5000-foot mark on the mountain sides, they seem to demand photography in color. So do the maples when they turn red, bronze, and orange; so do the oaks when they change their conservative dress of green for gayer garb; in fact, so does all Nature when in autumn it seems to be staging a glorious color binge before settling down for the winter.

Let us pause for a moment and reconsider the opening paragraph. I like it, I agree with it, but I am not certain that I will give it my exclusive approval. Do you, reader, feel the same way?

Autumn is the time for color photography — in October we can say that. But I felt the same way in the spring when the desert was covered with a soft green carpet and decked with all manner of wild flowers. That was when members of the usually reserved cactus family burst forth in a riot of blossoms that ranged in color from royal purple to bridal white.

I thought that summer was the time for color photography, too, when the lush foliage of the Southeast presented a never-ending panorama of contrasts. I had almost forgotten that there could be so many different shades of green. As for the summer clouds and the sky — they were ever-changing picture possibilities.

Nor need we stop with three seasons, for winter also will be the time for color photography. Then we can catch the welcome greens of the pine, spruce, and cedar trees, the blue shadows against the white snow, and maybe include a bright dash of red — whether it comes from a cluster of holly berries, from a blooming poinsettia, or from the cap of a human figure we use to add interest to the winter scene.

Yes, any time of the year is the time for color photography. Each month, each season, offers something different in the way of color subjects and contrasts. Nor does one picture or one roll of film end the matter. The more color pictures we take, the less inclined we are to view the same scenes in black-and-white.

Color photography is the thing but, as is usually the case, there are bound to be flies in the ointment. For those of us who like to process our own films, the flies in the ointment are the extra procedures required by color developing and printing. For those of us who are lazy and who send our films away for processing, there are several flies, also. One is the limited use for color transparencies. They can be seen to advantage only through some sort of a projector or viewer. Color prints from such transparencies are sometimes disappointing; despite all care and skill used in the processing, they tend to lose some of the color, beauty, and charm that they possessed in Nature.

"Tomato Worm" by Harry Hoke, from a color slide in the Chicago Nature Photography Exhibition, 1952.

Nor are these the sum total of color difficulties. Reproduction of color pictures in published form is difficult, too. The process is much more complicated than that for a black-and-white picture, and much more expensive, too. That is why many magazines still stick to the black-and-whites despite the advances made in color technique.

Incidentally, if you are interested in color photography and like to look at really good photographs, I recommend *Arizona Highways* as the publication that uses the greatest variety and best samples of the color photographer's art. Of course Arizona, as a State, offers tremendous possibilities (and challenges) in color photography. The magazine, published monthly by the Arizona Highway Department in Phoenix, uses an unusual number of color photographs in each issue. They are well worth study by anyone interested in color photography.

"Moth Placing Eggs on Twig" by Lou Quitt, Chicago Nature Photography Exhibition, 1952.

While we are on the subject of published color pictures, let me inject some information for readers who may yearn for publication. Most magazines that use color pictures prefer large transparencies; 4 x 5 is standard. That is because the pictures tend to lose a certain amount of detail in the process of reproduction and the larger the transparency, the less chance there is for loss. Unfortunately, the 35mm color transparency is rarely used in magazine work. Of course, if you are one of the very few big-name, globe-trotting photographers, you might market 35mm color shots, but that is because the editor knows your work, because he particularly wants the pictures you have taken, and probably assigned them to you to begin with.

There are definite techniques for color photography. There are numerous books, pamphlets, and instruction guides telling you just how to do it. Any library, book store, or camera shop can provide you with several of these. In fact, I recommend that you purchase one or two such guides and study them if you are serious about color photography.

After you have learned about the various kinds of film — Eastman Kodak and Ansco are the chief manufacturers — exposure and lighting techniques, you are ready to fare forth, camera loaded and ready, in search of subjects.

From here on it is up to you. You are the captain of your camera, you are the master of the fate of your film, and you are the guy who is responsible for the success or failure of the venture. Maybe that is stating the case too strongly but, at any rate, the picture can be good or bad, depending on the skill you use in taking it.

To make good color pictures, you should begin by developing a color sense (we are talking from an artistic rather than from a technical viewpoint now). You must see colors more clearly than you ever did before. You must see them not only as colors, but also in terms of light, whether direct or reflected.

A good way to do this, at least to make yourself aware of the differences, is to select some particular scene. It may be a tree in a park or meadow, a bridge over a stream, a mountain peak not too far distant, or a pleasant arrangement of rocks and boulders. Pick something, though, that is permanent, for you want to observe it under a variety of light conditions.

Begin as early in the morning as you wish and observe it at various times during the day. Notice how different it looks at high noon and in the afternoon when the sun is near to setting. The light at noon is clear and bright; white objects appear white in it. The nearer you get to sunset, the more yellowish white it becomes. The greens change value, and there is more blue and purple in the shadows.

In the early days of color photography it

was not considered advisable to try for early morning or late afternoon pictures. This is no longer the case. Take color pictures whenever you wish, just as long as there is enough light. Of course there are limitations — a shadowy stream bank in late evening is no place for photography so do not waste film in trying to photograph it.

As you become increasingly aware of the colors in Nature you "see" a great deal more. Sometimes the things you see cannot exactly be put into words.

I never cease to marvel at the color variations presented by the different sections of the country. That is particularly apparent to me as I move back and forth across the country each year, from Southwest to Southeast, from near-desert to near-swamp, from mountain vistas to sea level scenes. When people in one section of the country ask me what another section is like, I am frequently at a loss for words. How can I describe Florida to an Arizonan, or Arizona to a Floridian, or to a New Yorker, an Iowan, or somebody from North Dakota?

To me the greatest contrast between the two sections with which I am most familiar is a matter of color. The Southwest can best be described in pastels; in pale blues and violets, in soft grays, pinks, tans, and beiges. The Southeast has colors so strong they are almost violent; red and green, yellow and blue. There is little of a pale or pastel nature here. In fact, after the quiet reserve of the Southwest (and to me even the marvelous colors of the Grand Canyon and the Painted Desert are quiet and restful) I am almost frightened at the vigor with which things seem to grow in the Southeast. I wonder whether, if I stand in one spot for more than three minutes, some plant will throw a branch or root over me, take hold, and begin to grow.

It is only when I can show pictures — color slides — that I feel at all adequate in trying to describe one section of the country to dwellers in another.

READER REACTION

IT IS always nice to get letters and it is surprising the number of things I can learn from readers. For example, Mrs. Glen Stuart of Wakita, Oklahoma, takes issue with my June-July statement that there is a two-foot focusing range left uncovered in the close-up focusing of a Kine Exakta. She wrote: "Really, you are unfair to our cameras! The new Multiscope can be used at any range from half an inch to half a mile, according to Seymours ad at least. Since I cannot afford that, I get along quite well with supplementary lenses.

"With no extra lens at all, my Tessar f3.5 will focus as close as 20 inches. With the No. 1 lens, I can focus from 24 to 11 inches, with the No. 3 lens the range is from 16 to 8 inches. The No. 2 seems superfluous. Mine, at least, is almost exactly like the No. 3, focusing from 16 to 8½ inches. So there are no uncovered areas with these lenses and the definition seems to me to be very good."

To illustrate the close-up abilities of her camera, she sent along several sample pictures.

After reading Mrs. Stuart's spirited defense of the camera that is dear to both our photographic hearts, I got out my own Exakta and did some experimenting, sliding my focusing point along a yardstick to be sure of my measurements. Of course, Mrs. Stuart and I were talking about two different pieces of equipment — she was talking about supplementary lenses and I was talking about extension tubes. There is considerable difference. But, on the basis of what I found to be the case with my Biotar f1.2 lens and extension tubes, these are the focusing distances, made with a constant lens opening of f2:

Without any extension	30 inches
With mounts only	8
With shortest extension and mounts	5⅛
With middle extension and mounts	4½
With longest extension and mounts	4
With short and middle extension and mounts	3⅝
With short and long extension and mounts	3⅜
With middle and long extension mounts	3⅛
With all three extensions and mounts	3

So, with extension tubes, there is a 22-inch gap between the sharp focus point to be obtained without any extension, and with the shortest possible extension. As Mrs. Stuart points out, this gap can be filled by means of the No. 1 and No. 3 auxiliary lenses.

CHICAGO EXHIBITION

THE two pictures here were among those included in the seventh annual Chicago International Exhibition of Nature Photography, sponsored by the Nature Camera Club of Chicago, and displayed in February at the Chicago Natural History Museum.

The "Tomato Worm" print was made from a color slide taken by Harry Hoke of Stillwater, Oklahoma. The slide won honorable mention in the exhibit. The "Moth Placing Eggs on Twig" was made by Louis Quitt of Buffalo, New York. That print also won honorable mention.

Exact details for the next annual exhibit will be announced later, but in case you want specific information, write to H. J. Johnson, 2134 West Concord Place, Chicago 47, Illinois.

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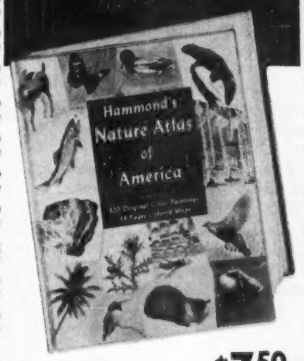

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"STONES" THAT FLOWER

(Continued from page 404)

lopes, tortoises, hares, and especially ostriches, to say nothing of man's domesticated stock, are all proven enemies of South Africa's flowering stones. Man, too, must be counted an enemy. In the past, Hottentots were known to relish the fresh-plucked plants, and even today the children of the Boers of the Karroo are not beyond nibbling on these "little toes" (*toontjes*), as they call them, of the desert gravels.

But to man's credit is the fact that many flowering stones, in their position of cultivated ornamental plants, have been assured by him of permanent protection against all enemies. The bizarre forms of these plants, plus the beauty of their radiant flowers coupled with their petty space requirements, have made them the special pets of the connoisseur of succulents. Some of the species even thrive in the sunny rainless desert supplied by a three-inch flowerpot placed upon an ordinary south-facing windowsill. It may be far from Namaqualand, or the South African Karroo, to America, but perhaps it will be on your own windowsill where you will first glimpse a "stone" in flower!

OH, THE MONKEYS DO HAVE TAILS IN ZAMBOANGA

(Continued from page 413)

sure of her grasp, he exerted every ounce of his strength and pulled himse'f back to her body. Breathless and weary, he hid his face in the loose skin about her breast to whimper soft reproaches, never once realizing that her seemingly harsh treatment had caused him to utilize fully for the first time the incipient muscles of his frail little arms and hands.

In a matter of days, Sumaya lost his fear of this new diversion. His crude sort of acrobatics, with his mother serving as both trapeze and safety net, became more spirited. Often she would hold his body with one hand only, allowing him to swing from her other arm, which she held rigid and extended. And when she removed the supporting hand from his back for the first time, it is probable that he did not even notice, for he had come to rely on it less and less. Before long he was ready for the next and final step towards freedom.

Just as she had first held him from her body and allowed him to clutch her arms, she now held him firmly by the waist as his fingers became accustomed to the strange new feel of a strong but slender twig. This time he was not afraid and squealed at her in what we were sure was nothing more than impatience. How many human children under similar circumstances might squeal just as he did now, "Let me go; Mother. I can swing by myself"

She seemed wistful and a little reluctant as she removed her hands from his waist. She sat quietly — almost sadly, we thought — watching him as he swung to and fro on the twig. Sumaya was no longer an infant. Now, for the first time, he had found a part of life in which he had no need of her.

THE SKIES FROM OUR EQUATOR AND POLES

(Continued from page 437)

years at a time, they are not seen at all. Since the full moon passes over the same path as that of the sun, six months earlier or later, and rides high in the winter sky, there are long hours of brilliant moonlight in the night sky at the north pole. Add to long hours of moonlight the brilliancy and extent of the displays of the Aurora Borealis, magnificent though they may be, and one sees that during the long polar night the light of the stars that are above the horizon is so dimmed that all but the brightest are scarcely seen at times.

Constellations of the northern hemisphere not far above the equator are poorly seen at the north pole because of the haze that dims the light of all but the brightest stars when near the horizon. Orion, cut in two by the horizon, shows but one first magnitude star, Betegeuze, its splendor dimmed by its unfavorable position. Sirius is well south of the equator and never seen. Procyon, like Betelgeuze, is dimmed by its unfavorable position near the horizon. Regulus and Altair are scarcely better placed. Spica we miss from the north polar skies and, of course, Antares in that far southern constellation of Scorpio. At the south pole, of course, in its winter skies one may see all of these constellations that are below the horizon at the north pole. High overhead at the south pole is a region of great dearth of bright stars or conspicuous constellations. No bright star indicates the position of the south pole of the heavens such as we have in our North Star, Polaris, to indicate the position of the north pole of the heavens. Indeed there is no star even as bright as second magnitude within 20 degrees of the south pole. This is a region of insignificant constellations until one comes to the famed and beautiful Southern Cross, and Alpha and Beta Centauri, in a brilliant portion of the Milky Way about 30 degrees from the south pole.

High in the heavens in the night sky at the north pole is the large and beautiful constellation of Ursa Major with its familiar Big Dipper and the Pointers to the Pole Star. Also one sees the conspicuous Little Dipper with Polaris at the end of its handle, close to the north pole in the zenith. Cassiopeia also is a brilliant group high in the heavens at the north pole. Here in Cassiopeia the Milky Way comes nearest the pole.

In October Mercury will be in the evening sky but too near the sun for observation. Venus also is in the evening sky but is still low in the southwest after sunset. Mars is now moving eastward into Sagittarius and is still as bright as a star of first magnitude but decreasing quite rapidly in brightness as it recedes from the earth. It will be found in the southwest after sunset. Jupiter now rises rather late in the evening in Aries and is visible the remainder of the night. Saturn is in conjunction with the sun on October 11 and is too close to the sun to be seen this month.

Bulletins Received

From the Division of Fish and Game, Department of Natural Resources of the State of California, come Game Bulletins Nos. 4, 5 and 6. They are, respectively, "The Jawbone Deer Herd," the joint work of A. Starker Leopold, Thane Riney, Randal McCain and Lloyd Tevis, Jr.; "Crop Damage by Wildlife in California" by Earl R. Biehn; "A Survey of California Deer Herds, Their Ranges and Management Problems," by William M. Longhurst, A. Starker Leopold and Raymond F. Dassmann. . ."Soil and Water Conservation and Use" is the title of a 75-page booklet published by the Oregon State College at Corvallis and is an analysis of the subject indicated in the title and made by the agricultural staff of the college. . ."Nature Study Equipment, How to Make and Use It" is the work of Pauline L. Sauer, published by Iowa State Teachers College, Cedar Falls, Iowa, at twenty-five cents. This is a practical suggestion to the teacher and presents many ingenious ideas.

Park Advisors

Horace M. Albright, former director of the National Park Service and now president of the United States Potash Company, and Dr. John O. Brew, director of the Peabody Museum of Archaeology and Ethnology at Harvard University, have been appointed to the Advisory Board on National Parks, Historic Sites, Buildings and Monuments. They succeed Charles G. Sauers and Dr. Frank M. Setzler, whose six-year terms as Board members expired last June 30.

ANSWERS TO "MYSTERIES OF NATURE"

1-d; 2-c; 3-h; 4-b; 5-f; 6-i; 7-g; 8-j; 9-a; 10-e.

ANSWERS TO BIRD PHOTO QUIZ

(1) American egret. (2) Brown thrasher. (3) Gadwall. (4) Roseate spoonbill. (5) Least tern. (6) Barn owl. (7) Ground dove. (8) Avocet. (9) Eastern kingbird. (10) Coots. (11) Lesser scaup. (12) Canada geese.

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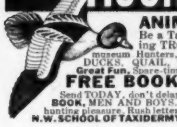

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Favored Trees

The Best Loved Trees of America. By Robert S. Lemmon. New York. 1952. Doubleday and Company. 254 pages. Illustrated. $3.50.

The author, who is an editor and naturalist, dedicates this book "to everyone who feels the majesty and mystery of trees." He then discusses in entertaining and informative prose, set off by excellent pictures, fifty-nine species of trees that appear to hold high popular position among lovers of trees. The trees are both local and widespread, ranging from the Monterey pine to the red maple, from the sugar pine to the white fir, from the coast redwood to the American holly.

Appalachain Trail

The third edition of *Guide to the Appalachian Trail in New England* has been published by the Applachian Trail Conference, 1916 Sunderland Place, N.W., Washington, D.C. This guidebook for hikers covers the trail from south to north, and north to south, in four of the five New England States it traverses, and is one of the five guides to the trail from Mt. Katahdin in Maine to Mt. Oglethorpe in Georgia. Besides information on the trail and side trails it contains information on first aid; wood pests and snakebites; leantos, shelters and public accomodations, and the history of the trail. The price is $3.00.

Chemistry

A Source Book in Chemistry, 1400 *to* 1900. By Henry M. Leicester and Herbert S. Klickstein. New York. 1952. McGraw-Hill Book Company. 554 pages. $7.50.

This is another in the series of Source Books in the History of Science brought out by this publisher and under the general editorship of Gregory D. Walcott. It has as its objective to provide material that will enable students to trace the main currents in chemical thought in the words of those who produced it. Selections from eighty-two noteworthy papers on the history of chemistry are included, with introductory statements that serve to link these together.

Museum Pictorial

Nature Photography with the High-Speed Flash. By Walker Van Riper, Robert J. Niedrach and Alfred M. Bailey. Denver, Colorado. 1952. Denver Museum of Natural History. 64 pages. Illustrated.

This is the fifth publication in the series entitled "Museum Pictorial" being brought out by the Denver Museum of Natural History. The authors, all three of them outstanding photographers, are concerned here with the interesting and often amazing results obtained by use of the high-speed flash invented by Dr. Harold E. Edgerton of the Massachusetts Institute of Technology. Some of Mr. Van Riper's work with this method have appeared in the past in the pages of *Nature Magazine.*

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I ADOPTED A WOOD THRUSH

By CAPTAIN WALTER EYRE-COOTE

TO THIS day I am not absolutely sure whether *I* adopted a wood thrush or a wood thrush adopted *me*. It is certain that a strong bond of understanding and friendship grew up between us.

I was seated on a second story piazza in a house on the outskirts of Boston, when suddenly I saw what I thought was a kite sailing through the trees in my direction. Upon closer observation I discovered it was part of a roll of paper, about three feet long, and it was being towed by a bird. I immediately rushed for my field glasses and found it was a wood thrush, and he, for it was the male, was building a nest within thirty feet of my piazza and almost on the same level.

Interesting, wonderful days followed, watching the paper being carefully woven with pieces of string, straw, etc., until one day I was rewarded by seeing a dainty little head resting comfortably on the rim of the nest. Mother was keeping house. Father, in the meantime, had selected a branch on a nearby tree where he sang constantly.

One day I returned from Boston at an early hour and decided to use the back entrance, which took me past the foot of the tree where the nest was. I do not think I ever took such a barging and upbraiding in my life. I certainly learned the warning cry of the wood thrush on that occasion. Next day I heard it again. I happened to be dressed in white at the time. I rushed out immediately; it was a cat. A few swift claps of my hands drove the intruder away, and I went indoors at once so as not to disturb him further. Next day the alarm really went off in high gear; distress was evident in every wailing plea. Of course I rushed out again. Two crows were perched on the top branches of *his* tree. I do not think they will be back. I waited some time to make sure and, strange to say, he did *not* upbraid me this time. Only once, several days later did I get a tongue lashing, that was when I appeared in a dark suit; but by then he seemed to have accepted the white suit as a badge of friendship and protection.

By this time I thought I had heard every discordant note in the wood thrush's repertoire of fear and distress. I had not heard anything! One day, after the babies were born, it seemed as if all Hell was let loose; both male and female scolding, pleading, screaming, urging! In my race through the laundry I grabbed the only weapon I could find to throw — a bag of clothes-pins. And there, sure enough, was a gray squirrel on the very branch that supported my little friends' home, now part of my home. As luck would have it, when I threw the bag of clothes pins, the string broke, and I do not think that squirrel was hit so many places at the same time in his life before. The last I saw of him he seemed to be headed in the general direction of South China. After this I ventured out one day when all was peaceful and quiet. Both birds were evidently away collecting food for those hungry little mouths I could now see so plainly. I carried out a garden chair and sat down to read. It was not long before I became aware that one of the birds was very, very close to me — telling me the sweetest little story I ever heard in my life. It was the female. She seemed to be warbling down in her throat, without opening her beak. Perhaps this is what Longfellow had in mind when he wrote:

"He sings to the World, she sings to her nest —
In the nice ear of Nature which song is the best."

I do not know what she was saying to me, but I do know there *is* a universal language in Nature, which I have described in "My Pastoral" and to which each and every part of Life is conscious.

Conservation Yearbook

The Conservation Yearbook, 1952. Edited by Erle Kauffman. Washington 6, D.C. 1952. The Conservation Yearbook, 1740 K. Street, N.W. 288 pages. $5.00.

The editor provides a subtitle to this book — "A Directory and Guide to Facts, Figures and People in American Conservation." It is, indeed, just that, and represents a tremendous task of assembling, organizing and presenting a vast amount of information. While directories to the field of forestry and parks have been brought out in the past, Mr. Kauffman's yearbook cuts across all conservation fields. Several thousand questionnaires and other information-seeking letters were sent out to bring this material together. This information was sought to provide the first "annual directory and guide to agencies, commissions, boards, associations foundations, societies and other organizations concerned with the conservation of organic natural resources, to the men and women who plan and direct the conservation program, and as an authoritative source of information on the progress of this program." The editor hopes that this first *Yearbook* will serve as a reference guide and that it will inspire suggestions that will be helpful in preparing a 1953 edition.

Ostertag Honored

It is particularly appropriate that Congressman Harold Ostertag of Attica, New York, should received the Smokey Bear Award for outstanding service to conservation, since Mr. Ostertag co-authored recent legislation to protect Smokey Bear from misappropriation. Also the Congressman has a long record of contribution to forest conservation, having most recently fostered a campaign for forest fire prevention on a cooperative basis. The award was presented by Richard E. McArdle, newly appointed Chief of the United States Forest Service.

Guide to Mammals

A Field Guide to the Mammals. By W. H. Burt and R.P. Grossenheider. Boston. 1952. Houghton Mifflin Company. 200 pages. Illustrated in color and black and white. $3.75.

This is the latest addition to the growing list of field guides being brought out under the general editorship of Roger Tory Peterson, and following the plan so effectively used in the editor's own *Field Guide to the Birds*. This new guide gives field marks of all mammal species found north of the Mexican border. The text and maps are by Mr. Burt, and the illustrations, most of which are in color, are by Mr. Grossenheider. This book is as easily usable as are the other excellent books in the series. A series of plates shows skulls, mostly of the smaller mammals, as an aid to identification of such remains that may be found. One hundred and eighty-seven species are illustrated in full color, making this far and away the most fully illustrated, color-wise, mammal guide.

Wild Woods Folk

Wild Folk of the Woods. By Carroll Lane Fenton. New York. 1952. The John Day Company. 127 pages. Illustrations by the author. $2.50.

One never fails, when looking over their varied writings in book form, to marvel at the versatility of the Fentons — Mildred and Carroll. They can move from a textbook, to an identification book about rocks and minerals, and then to a juvenile book. This latest volume is authored and illustrated by Carroll Lane Fenton and is aimed at an audience in the four-to-twelve age bracket. It is a companion to two earlier juvenile books by the same author. This immediate publication deals with thirty-six different creatures of the woods and their relationships one to another and to their habitat.

Working Wood

Woodwork for the Beginner. By Franklin H. Gottshall. Milwaukee 1, Wisconsin. 1952. The Bruce Publishing Company. 139 pages. Illustrated. $4.00.

This is a practical book presenting thirty projects in woodworking for the beginner who finds a hobby interest in working with wood. Organization of each project is outlined and plans and drawings provided. Beside the steps in actual building, information on wood finishing is given.

Western Gastropods

Illustrated Key to West North American Gastropod Genera. By A. Myra Keen and John C. Pearson. Stanford, California. 1952. Stanford University Press. 39 pages. Illustrated. $1.50.

This key to the marine gastropod mollusks — snails and slugs — found from San Diego to Alaska, covers 240 of the Pacific Coast molluscan genera. It is based on shell characteristics only, and the illustrations show representatives of all the genera.

THE READER'S MARKET

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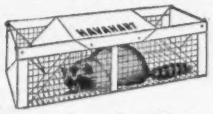

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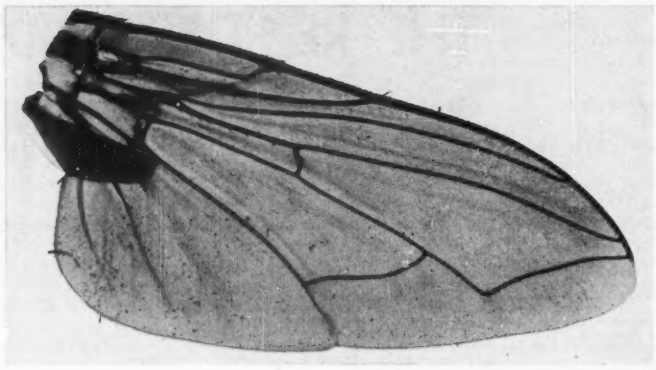
UNDER THE MICROSCOPE

By JULIAN D. CORRINGTON



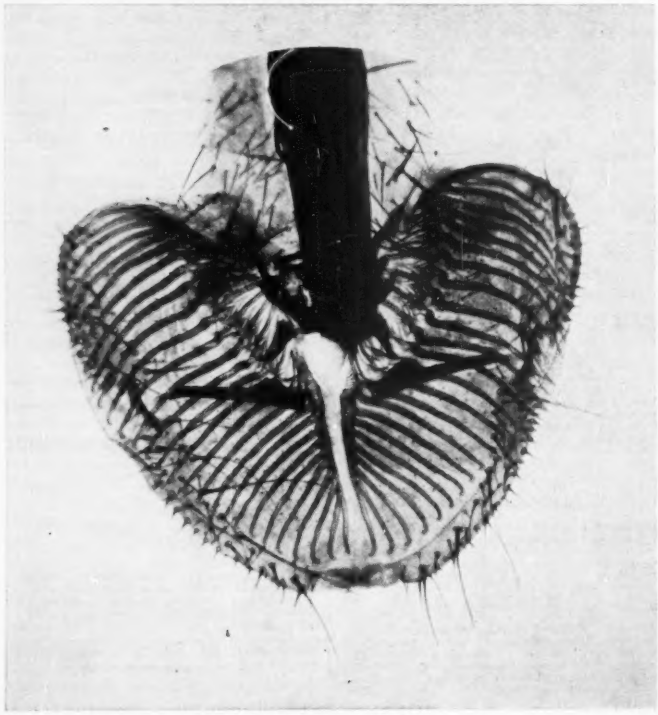
House fly's wing.

PESKY CRITTER

AMONG the earliest objects seen in enlarged views through the first microscopes were flies. Galileo called one of his instruments *occhiale*, or fly-glass, stating that one could "see a fly as large as a hen." Later a popular form of simple microscope was known as a *vitrea muscaria*, also meaning a fly-glass, and these must have had somewhat greater magnification, or the observer greater imagination, for one user wrote of "that wonderful microscope by which a fly was made as large as an elephant and a flea the size of a camel."

But ages before man had microscopes to augment his vision, he had flies to annoy him at work or at rest, to crawl over and pollute his food, and to transfer dangerous infections. There are many kinds of flies, as readers of our *Beginner's Primer* will have been aware for some time, but to the average person, a fly is a house fly, *Musca domestica*, ubiquitous and cosmopolitan pest. There have been attempts to stigmatize this insect by popularizing the common name, "typhoid fly," but while we shall give the public health people "A" for effort, the term has not caught on too well. We had best keep trying, however, since not only typhoid, but at least thirty different diseases, including cholera, anthrax, both amoebic and bacillary dysentery, tuberculosis, trachoma, tetanus, and leprosy have been tagged to this fly as vector (carrier). The insect is an unconscious and mechanical agent in all these cases, but none the less dangerous to human interests, and man must be unrelenting in his entomological warfare if he is ever to eliminate this scourge.

Everyone thinks he knows a fly when he sees one, but many are fooled, since there are several species that closely resemble one another. Are you among those who think that the house fly "bites more viciously just before a rain?" If so, you are all wet — from the rain of course. House flies do not bite at all, and if you feel the pain of a stab from an insect you take to be an ordinary fly, you are generalizing in an unscientific manner and do not know *Musca domestica* when you see him. The culprit is probably the stable fly, *Stomoxys calcitrans*.



Labella of fly's proboscis.

Here are some of the diagnostic features of the house fly: The adult insect may be black, or grayish, or yellowish, and from 4 to 7.5 mm long, averaging about ¼-inch. There are nearly always four equal, dark, longitudinal stripes on the upper surface of the thorax. The head is large and free and the compound eyes are huge but do not meet on top of the head; in fact, Essig cites as a chief distinction the fact that the space between the eyes on top almost equals the width of an eye. The antennae are three-segmented, the first very short, the second medium, the third long and large; from the base of the third segment the arista (bristle) curves outward and is plumose all the way.

Now observe the illustration of the wing. Along the upper margin there are several heavy black lines that reach the edge from the interior. The first, near the base, is the costal vein, the next the subcostal; then comes a series of numbered longitudinal veins and that designated as number 4 runs out almost to the wing margin, below the apex, then turns abruptly upward, at approximately a right angle, to reach the margin just barely below longitudinal vein 3. This feature is an important diagnostic character.

Chief microscope slides to be made from the adult are the antenna, mouth parts, wing, and leg. The entire insect may be mounted, but there will always be some splitting or distortion of parts, and the separate mounts are better. They should be potashed, as the fly is darkly pigmented, but not to the extent of becoming transparent. We have seen slides in which the exoskeleton was rendered wholly transparent, then stained with eosin or fast

Foot of house fly.

green. This sort of preparation is both unnatural and unnecessary.

The house fly's mouthparts were beautifully figured by Robert Hooke, in his *Micrographia* of 1665, and have ever since been a favored subject with which to demonstrate the amazing revelations of the microscope. If reference is made to an accompanying illustration, this complex organ may be described. On the entire insect's head, there is a basal portion of the mouthparts called the *rostrum*, attached to the head and bearing two small *palps*, not shown in the photograph. Next comes the *haustellum*, an intermediate stalk, the lower end of which is pictured, followed by the two *labella*, the large ribbed structures. Between these, the white channel is the *prestomum*, which leads directly to the *mouth opening*, the rounded upper end of the channel. The ribs are termed *pseudotracheae*, as they were formerly thought to be tracheae or breathing tubes, which they somewhat resemble. Actually they are food guides, chitinized in a manner like tracheae. The dark bars are sclerites, serving to reinforce the apparatus.

In feeding, a fly continually explores surfaces over which it walks, testing with the labella. These lobes are carried folded when at rest, spread when questing. If an edible object is encountered, the labella are flattened against and conform to the irregularities of the surface. Now the fly regurgitates a "vomit drop" from its crop, where previously ingested food has been stored, and this serves to dissolve the new food. This habit, more than any other, makes the fly a dangerous enemy of mankind. It may take in some contaminated material including, for example, typhoid bacilli, then regurgitate some of this matter on human food at its next stop. These drops make up the majority of the familiar fly specks, although some are fecal in origin. After reading this description and studying the illustration, or a microslide, try to observe the mouthparts in action on the live fly. Use a hand magnifier, if available.

Referring now to the illustration of the fly's foot, the part that is shown is the *tarsus*, the terminal division, composed of five segments. The last segment is provided with a pair of curved *claws*, beneath which are seen the two *pulvilli*. These are pads or cushions, which bear many hollow glandular hairs (*tenant hairs*), enabling the fly to walk up walls and across ceilings, upside down. So remarkable and well-known is this ability that the term "human fly" is applied to those dim-witted persons who make a living (while it lasts) by climbing up tall buildings. Between the pulvilli is seen the *empodium*, a single spine. The sticky hairs of the pulvilli are another and important way in which flies can transfer pathogenic organisms from place to place.

The life cycle of the fly is not a pretty subject. For this reason it is all too often glossed over or omitted from discussions when it should be brought out into the open; then it would be plain that the house fly is a serious menace to human life and health and that entomologists and public health people are not just crying "wolf." Then mother would have a fit if she saw a fly walk across the baby's face instead of treating the occurrence as trivial.

Female flies lay their eggs in batches of 100 to 150, and may deposit several batches totaling as many as 2000 eggs. These are small, white objects, elongate and curved, and are always placed in filth. Before the day of the automobile, horse manure was the favored site, with the excrement of other animals second choice, including cow, pig, man, and chicken. Swill, garbage, or other decomposing organic materials are also used, for what is filth to one animal may be food to another. The eggs hatch within a few hours, usually 10-24, depending on temperature, and the larvae feed and grow rapidly.

The larva or maggot is about 2 mm long at hatching and grows to a length of 12 mm, with three instars and three molts over a period of 4 to 8 days, averaging 6 days. It is a blind, white creature, shaped like a long thin triangle, the pointed end being anterior, the rear end truncated. The head is so greatly reduced that the fly maggot is described as "headless;" actually there is a vestige, followed by 13 body segments, only 11 or 12 of which are visible externally, the head and first one or two body segments being retracted within the trunk. A pair of chitinous *mouth-hooks* is present, used to hold fast, to hitch along, or for boring. The food ingested is always in liquid form, so nothing in the nature of teeth is required. *Pseudopods* (false feet) occur along the ventral surface of the body, temporary fleshy projections that serve the same

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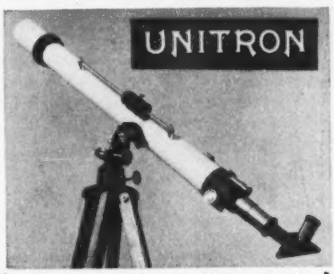

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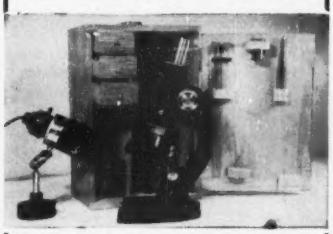

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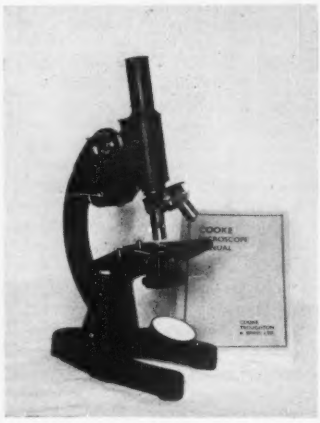
purpose as the prolegs of the caterpillar, but are less well developed. Respiration is by two pairs of spiracles in many flies, but the house fly belongs to that division in which only the posterior pair function. These are borne on *stigmal plates*, facing to the rear, and the pattern and markings provide entomologists with their surest guide to the identification of species of fly larvae. These plates and the mouth-hooks may be prepared as whole mounts by those who wish to add such slides to their collection.

When the last larval skin has been shed it contracts to a firm and shiny texture, turns reddish-brown in color, and serves as a case for the animal within, now a pupa. Such a type of pupa, using the last larval skin, is called a *puparium*; in *Musca* it is a seed-like object 3-6 mm long and distinctly segmented. This stage lasts from 3-6 days or, in cold countries, is the wintering-over phase. Then occurs a most remarkable event by which the adult winged fly escapes from this imprisoning case; a retractile bladder, the *ptilinum*, is protruded from the front of the head, pushing off a circular lid or *operculum* at the anterior end of the pupal case. A circular seam or *raphe* has meanwhile developed on the case, and flies which emerge in this manner are distinguished as members of the Suborder Cyclorrapha, or Circular-Seamed Flies, whereas those coming out through a straight split, as is the case with mosquitoes, comprise the Orthorrapha or Straight-Seamed Flies.

House flies, vectors of scourges, may be controlled by destroying their breeding places. Manure for fertilizer can be spread on the fields, stored manure may be kept in protected containers, exposed manure heaps may be sprayed with any of several poisons; both larval and adult flies may be trapped; adults may be swatted, sprayed, caught on fly paper or poisoned in a dish, killed by electrified or poisoned screens; garbage may be disposed of in sanitary ways. The main thing is to arouse the public to make concerted and regular efforts; the usual feeble and sporadic attempts at fly destruction either fail or are local and temporary. With the decline of the horse there are large areas of the United States where the house fly is rare or unknown today — striking evidence of what could be the case everywhere if people would only put the effort into this most important campaign that they do in yelling at a football game. The microscopist, with his knowledge of fly anatomy and habits and of bacteria is in a favorable position to make demonstrations that will convince the hard-headed, lead discussions, read papers, and use many other publicity methods to play an important part in this urgent and worthy project.

COOKE MICROSCOPES

WE RECENTLY had the pleasure of examining some very handsome British microscopes. Whereas Zeiss and Leitz and sometimes other Continental optical companies have been able to compete with American manufacturers in spite of the tariff, British firms have generally not found this possible, and their products are seldom seen in the United States. The tight little island has half-a-dozen prominent makers of microscopes and related scientific instruments, and one of these is Cooke, Troughton & Sims, Ltd., of York.



The Cooke School Microscope, model M1250, shown herewith, is a sturdy full-sized instrument, with crackle finish on the stand and satin finish on the tube. There is an inclination joint, adjustable mirror with plane and concave surfaces, and, as a feature not seen in American instruments of comparable price range, a substage mount with iris diaphragm and holder for blue glass filter. This basic stand and tube is supplied with or without side fine adjustment, triple revolving nosepiece, graduated attachable mechanical stage, and fitted wooden case with lock and key. Here are some current prices — stand with side fine adjustment and wooden case, $72; triple nosepiece, $13; 33 mm objective, $11; 16 mm objective, $16; 4 mm? objective with special condenser, $26; either 6X or 10X eyepiece, $5.50; mechanical stage, $61.50.

All objectives are achromatic. The 4 mm used with the substage condenser provides a superior image of great clarity, while the 33 mm glass gives the low magnification so often needed and so seldom available.

The Cooke M1170 general purpose microscope with optical equipment E was a delight to handle and use. This fine instrument was provided with an inclined revolving eyepiece holder, two eyepieces, objectives 16, 4, and 1.8 mm in triple nosepiece, built-in mechanical stage with side adjustments and verniers, rack-and-pinion focusing substage with N.A. 1.20, 2-lens condenser, and fitted wooden case with lock and keys, the whole priced at $419.50.

One noteworthy although minor feature of the M1170; the objectives were marked with huge numerals so that there could be no mistaking their magnification, and each had a wide enameled band of a bright and distinctive color. This is a far cry from that day, now fortunately in the past, when manufacturers apparently went out of their way to conceal the identity and performances of their objectives and oculars. Anyone interested in more about Cooke microscopes should correspond with the United States agents, The R. Y. Ferner Co., Inc., 110 Pleasant St., Malden 48, Mass.

NEW BIRD SONG RECORDING

THE Albert R. Brand Bird Song Foundation, Laboratory of Ornithology, at Cornell University, has issued a new record, *Florida Bird Songs*, produced by Professors P. P. Kellogg and A. A. Allen. On the inside back cover of *Nature Magazine* for June-July of this year appears a detailed advertisement for the celebrated *American Bird Songs*, Vol. 1, an album of six 10-inch vinylite records, 12 sides, and Vol. 2, five double-faced records, together capturing the songs of 121 different birds, as well as *Voices of the Night*, a superb album of four double-faced platters, recording the calls of 26 frogs and toads of Eastern North America.

The same men have brought out this new record from Florida, but with the benefit of long experience the techniques have been mastered so that the new renditions are far superior to the old. The clarity and fidelity of the Florida songs are remarkable. When we played the mockingbird's song recently for a class in ornithology in a third-floor lecture room, a real mocking-bird promptly came to see who was invading his territory, then joined in, and the students were agog trying to listen to and discriminate between the actual voice without and the recorded one within.

One surface contains the songs of birds of the gardens, groves, and suburbs — mockingbird, cardinal, Florida wren, blue jay, and boat-tailed grackle. The reverse side brings together some rare birds of the wilderness — marsh, cypress, or glades — the ivory-billed woodpecker, Florida sandhill crane, limpkin, barred owl, and chuck-will's-widow. The songs were recorded in the natural habitat of each bird by the staff of the Laboratory of Ornithology at Cornell, with the assistance of David G. Allen, Byrl J. Kellogg, and James T. Tanner. The barred owl was recorded by Jerry and Norma Stillwell. Order from the Comstock Publishing Associates, 124 Roberts Place, Ithaca, N. Y. $2.50.

SUGGESTIONS WANTED

This department is at the service of its readers and welcomes inquiries and problems to solve, or try to solve. It also hopes that readers will come forward at any time with criticisms and suggestions of material they would like to see presented on these pages. Only in this way can Under the Microscope fulfill its functions to the fullest.

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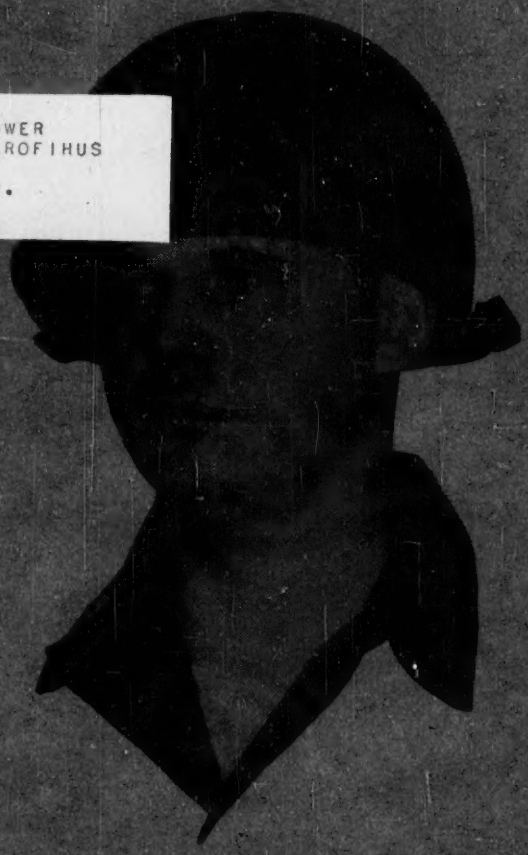

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